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INTRODUCTION

Ideals pass into great historic forces
by embodying themselves in institutions.

(Hastings Rashdall, 1895)

The safeguards of civilization and the purposes of civilized man are intimately dependent upon ideals that have become embodied in institutions. Parliamentary rule, trial by jury, English Common Law, the Federal Constitution, and many agencies of our Government (including the Department of Health, Education, and Welfare, and the National Institutes of Health) are bold and effective institutional expressions of ideals.

Behavior is the outward expression of internal values. Ideals contribute to the improvement of internal values. The internalization of an ideal is tremendously accelerated by social consensus. This may take the form of an institutional "tradition," or an ideal may become a social convention, an "institution" in its own right. Ideals may become "unwritten law." In this form they are more powerful than any statutory regulation. Most social behavior is governed by the force of social conventions, popular ideals, without need for legal intervention. Ideals can be too idly taken or, on the other hand, fall into disrepute. This leads to a deterioration of internal values which in turn is reflected by a deterioration in behavior. Ideals tend to "run downhill" and on this account need to be continuously striven for.

Ideals are not only important historic forces but they evolve historically. Hard-won human values are safeguarded and extended mainly through the evolution of improved ideals. To accomplish this, ideals need to evolve at a rate that will

* As in previous Annual Reports, the Laboratory Chiefs have provided comprehensive statements of research progress throughout the year. I have attempted here to continue as in the two previous Annual Reports an exploration of more general scientific issues. These tend to be overlooked in the immediacy and seeming urgency of our daily undertakings. Yet I believe they are truly pertinent to our ultimate best achievement.

match the changing forces of circumstance. Ours is a period when ideals do not seem able to keep pace with social, economic, political and scientific changes which appear beyond our understanding or control. It may be that every period of history has this aspect, yet ours is fortunately the only one we have to face.

Although we are inclined to deprecate altruism, faith and mutual trust as being "unreal" or "impractical," we actually live by these ideals. Mankind could not have even lasted to this risky moment without having developed steadfast biological foundations for altruism, faith and mutual trust. These functions are built into our chassis, so to speak. These vital mechanisms have earned for us our biological as well as social freedom. Coupled with awareness, such ideals can impel achievements that will still further enlarge human dignity and freedom. It seems necessary only to encourage a greater awareness of the opportunity before us. The rest would seem to follow. Improvement will be measured in "little pieces of the striving," in any single act intended toward the realization of an improved ideal.

The purpose of this essay is to discuss certain ideals relating to the pursuit of science, relating to the interface existing between science and society, and to the contributions which science should be making toward the encouragement of worthier social purposes and means. It is my intention to show that:

1. The selection of worthier values in a democratic society depends upon ideals conceived by individuals, especially by individuals possessing training and experience in the dispassionate exercise of evaluative skills. In recent years this process which is essential to democracy has been eroded and given away.
2. In science there has been an unfortunate rejection of the importance of evaluative judgments, and of the desirability of scientists contributing in a professionally broad and responsible way to the determination of social purposes and means. Only through an effective and disinterested assumption of this responsibility can science escape from being a toy of technology, pitted against all manner of competitive special-interest seekers throughout society.
3. Science is revealing a new ethic which is based upon scientific rather than religious or philosophical grounds. Through these findings, science may be enabled to provide an increasing power and guidance for "life, liberty, and the pursuit of happiness."

4. Science itself is a valued human enterprise which has much to offer society, both apart and beyond utility.

5. What would seem to be most urgently required in all this is first, a more successful interface between science and society, and second, a greater sense of professional responsibility and probity among scientists. This latter will call for the resumption of something akin to the idealistic spirit of craftsmanship, akin perhaps, to the professional notion of a guild.

All this will require individual internal actions as well as administrative changes relating to the conditions of scientific enterprise. Neither the individual internal actions nor the administrative changes will suffice alone. But they are achievable, together, as a natural outgrowth of the wider recognition and exercise of man's capacity for altruism, faith and mutual trust.

SOURCES OF PROFESSIONAL RESPONSIBILITY

In a democratic community, where can responsibility be placed for formulating and improving the ideals and purposes of society and its institutions? Does the responsibility lie in the White House? In the Cabinet? In the Congress? In the Supreme Court? In the communications industry? In the marketplace? Among the citizenry at large?

Improved ways of handling society's problems need to be conceived and made available broadly throughout society. Through the action of political and social leaders, evolving ideals will influence the development and improvement of society's purposes and means. Among the most important means available are institutions which themselves progress through becoming more closely approximated to the noble ideals for which they represent an embodiment. It is chiefly by this leavening of ideals that society can be improved, and chiefly by means of institutions that ideals can become "great historic forces." Each of us shares responsibility for the choice of both the ends and the means of our society. Desirably, this responsibility is borne through the exercise of individual interpretations, formulated as conscientiously and rationally as possible. This is essential, by definition, in a democratic community. Individual default of conscience in this public responsibility is detrimental and morally reprehensible.

In addition to such broad-based individual responsibility there is also professional responsibility, borne variously by lawyers, physicians, teachers, scientists, civil servants, and

others; professional responsibility which is far heavier than that borne by the citizens-at-large. This additional responsibility grows out of the professional skills and experience of the individual. Thus, as scientists we bear a professional responsibility because of our first-hand knowledge of the nature and potentialities of science. This makes us responsible not only for the excellence of investigative work for which we are more or less directly responsible, but also for contributions of professional insight and effort toward achieving a worthier destiny for our social and institutional environments.

Our responsibility in this more inclusive professional sense derives quite naturally from the facts: i) that our own professional destiny is intimately bound up with the achievements of our immediate professional community, ii) that this group in turn has the capacity to contribute more effectively to the achievements of our society, and iii) that our responsibility for a share in making this go well in its entirety is neglected at our own peril, individually, institutionally and as a society.

Somehow organizational and societal bigness has induced a psychological dwarfing of the conception of the only proper role of the individual in a democracy. The town meeting ideal has been lost to some degree, and individual responsibility, especially individual professional responsibility, has been eroded and given away. This ideal has been eroded insofar as individuals and institutions reject individual responsibility or fail to allow for it. Rejection is of course encouraged by those whose ambition favors their own limited interests. Failure to allow for it has two principal origins: one, a lack of faith in the willingness or capacity of individuals for bearing such responsibility; the other, an unwillingness to cope with the confusions that arise out of the widespread exercise of individual responsibility. The ideal has been given away insofar as those to whom it should belong have not conceived the need for or exercised such responsibility, or because they enjoy responsibility that is strictly limited to their own immediate work, or because they accept a view of themselves as helpless cogs, too ineffectual or too inadequately informed to be able to exert an effect on the massive and supposedly inflexible institution or society.

To the extent that individual responsibility and especially individual professional responsibility is precluded, or avoided, our institutions and society are made to depend upon undemocratic procedures. This is perhaps not disadvantageous in itself in the short view, and under a broadly responsible and objective leadership, but it inevitably entails two further substantial losses, both of which bear

importantly upon our ultimate institutional and social accomplishment. First, there is a loss of the many conscientious and responsible intellectual contributions which otherwise could have been made toward a more desirable destiny. Second, there is a subtler but more influential loss of group identification and motivation which otherwise derives from the sharing of social responsibility.

PROFESSIONAL EVALUATIONS INDISPENSABLE TO SCIENCE AND SOCIETY

It is often supposed that scientists deal rather exclusively with facts, and that they eliminate from their deliberations any considerations of value. It is supposed that facts are assembled by scientists and systematized in relation to other facts, whereupon out of the examination of such relations emerge general "laws of nature." Misunderstandings arising from this supposition may be devastating. Scientists have been blocked or dismissed from responsible positions, in part at least on the assumption that their reasoning can and should exist in isolation from considerations of value. This primitive supposition that scientists should be professionally obligated to reject value discriminations, or that they are ill-fitted by their scientific experience to make value discriminations, represents a completely inadequate conception of both the scope and method of science.

1. Evaluations in science. It is true that in the factual stage of inquiry scientists try to characterize their observations in a form as free as possible from personal bias and opinion; this is an ideal toward which all scientists strive. But facts, even when ideally established, are only bricks from which the structure of science is developed. By themselves, facts tend to be uninteresting. The really significant features of science are established from facts which are given meaning, viz., value, through conceptual thinking.

From start to finish of any scientific problem, scientists are engaged in value discriminations, in committing themselves to choices which severely delimit whatever may be the ultimate value of their scientific accomplishment. The selection of a problem to study, choice of methods, development of conceptual and technical operational definitions, attempts to isolate facts from artifacts and from underlying assumptions, selection of those facts presumed to be objectively meaningful, interpretation of the factual data (which are inevitably compounded of theoretical interpretations and sense perceptions),

and the representation of these data and interpretations for the purposes of meaningful communication -- each step in scientific accomplishment requires value discriminations of a high order. A differential capacity for handling these difficult discriminations is the principal distinction between the truly great and lesser scientists.

The profession of science therefore demands an exercise of value discriminations and provides a continuing disciplined experience in making such evaluations. It can readily be conceded that only scientists are professionally qualified to make judgments concerning values that are intrinsic to science.

2. Evaluations of scientists. All of science and technology depends upon a small but indispensable population of creative scientists. Such men are professionally disciplined to deal with peculiar instrumental devices, with abstract thought at the limits of conception, and with certain general principles which guide their intellectual progression. What a scientist sees with his instruments and what he interprets from these revelations is by no means obvious. As I have written elsewhere, "A more adequate understanding of nature cannot be achieved in the abstract; it must be brought about through the consideration of materials with which the scientist is already familiar. Even the most gifted and energetic person must have achieved a certain mastery in the field of his pretended accomplishments. He must have a keen sense of what needs to be done to solve a given problem and a sufficient skill to do that.... Important scientific achievements thus seem to depend upon the fruitful combination of a group of essentially positive factors; some of these relate to the competence, self-discipline and nimble imaginativeness of the scientist himself and others concern his surroundings. Research in laboratories of the Federal Government will surely progress in the sense of advancing the frontier. And the rate of advancement may be speeded up somewhat by administrative hustling or by providing additional money or personnel in a given field. But saltatory advancement of concepts--- the kinds of change in point-of-view that may alter the entire character and direction of scientific pursuit, the kinds of advancement that may cut short years of striving--- these are not likely to occur except where circumstances are especially favorable for creativity. In the long run, the reputation and credit of any laboratory will depend upon a few advances of this sort far more than upon the extension of studies that now seem entirely familiar."

The creation of worthier new concepts in science is impossible without intellectual non-conformity. What is considered to be "logical reasoning" evolves as a delayed consequence of scientific achievement; thus the steps in

the formation of a new concept not only seems alien and eccentric and in conflict with common sense, but they frequently seem "illogical." It must be remembered that any concept is a "freely chosen convention" and nothing more: it is yielded through intuitive and non-logical mental processes which are not under any satisfactory degree of voluntary control. Abstract ideas involved in the creation of a new concept need to be "played with" imaginatively, often over a period of years, before a truly new level of understanding is achieved. It is only after a new concept has been clearly differentiated that the logical processes of science and the disciplined testing against sense experience can be pursued.

The history of the growth of scientific concepts makes obvious a primary requirement in scientists of a high level capacity for conceptual thinking coupled with a capacity not to hold any concept too dearly. Widespread acceptance of a new level of understanding in science is achieved through the examination of evidence that is made as free as possible from personal appeal, coercion, or "fashion" of thinking, and without recourse to authority external to the body of science. As a system of thought science is practically unique in not being imposed by coercion or persuasion, and in not being destroyed when found internally inconsistent; paradoxically, science becomes stronger and more coherent as its limited views are made manifest. The search for a Scientific Truth (which can never be realized) becomes ever more powerful as error is discovered in lesser "scientific truths."

Science, in contrast with many other callings, naturally creates a zeal for integrity; a lie in science cannot persist, for it will be found out through the continuing activities of science. Scientists are professionally indoctrinated to the practice of probity. They fail in this regard only insofar as they are persuaded to abandon their professional role in society. Scientists alone are adequately qualified to evaluate a fellow scientist and his scientific performance. Since scientific accomplishments of high quality are the *sine qua non* for the existence of a scientific establishment, the code for the selection and promotion of scientists must be based upon scientific considerations applied by scientists knowledgeable concerning both the individual and his field of learning.

The profession of scientists is uniquely knowledgeable concerning the criteria underlying those discriminations which will foster genuine scientific excellence. They alone can prevent the freedom, which creativity requires, from being used as a shelter for inefficiency, superficiality or uncritical partisanship. Scientists are well aware that if their own profession does not provide these discriminative evaluations, they will nevertheless be made by others who

may lack the necessary qualifications. If this comes about (through casualness or default of the scientists concerned, or by direction of persons unfamiliar with the values and conditions essential to professional excellence), the resulting actions are certain to breed suspicion and controversy that will be deeply injurious to the internal order and to the external standing of the institution.

3. Evaluations of science in relation to society.

Science consists of a collection of information, a body of theory and a methodology. All of the disciplines of science share in their dedication to certain general principles of inquiry and evidence: this forms the only basis for the unity of science. Science is one of the few creative intellectual activities that is truly progressive. Theoretical notions tested and found valid are of use in the pursuit of further understanding. It is this progressiveness which gives science much of its power. A further source of power derives from the scientists' internal discipline always to seek simpler and more general expressions to account for the vast schemes of nature.

Since World War I, science has become dominant in generating and directing the development of technology. In earlier years, the relations between science and empirical discovery were sporadic, with practice influencing theory more often than the reverse. Since World War II, science and technology have been more and more lumped together. There is now developing a widespread concern within the Executive and Legislative Branches of the Government regarding the extent of tolerance to be allowed for the "tyranny" of which science and technology seem to be capable. The question of how, i.e., by whom and by what criteria science is to be evaluated, is acute as well as important.

Several serious problems need to be addressed: How does science need to be distinguished from technology in terms of both its planning and realization? How can the intellectual content and power of the educational and research activities of science be strengthened? (How can the mutual interdependence of science and the humanities be more fully recognized and made effectual?) What branches of science need encouragement for the immediate and more distant scientific and technological advantages of society? (How can scientists best participate in the social value determinations this requires?) How can program developments in science be generated and encouraged more in accordance with professional scientific rather than simply political and economic conceptions of need

and of research potential? In a science mart of limited resources, how can the tendency for competitive over-justification, for "tyrannizing with facts" by scientists be discouraged? (How can such forthright and natural traits as professional congruity and candidness be given greater encouragement?)

Few of the answers recommended for these problems have been put to any test. The problems themselves are not diminishing; they are getting worse as public demands and needs are expanding and as competition beyond the control of our society is exerting an avalanche of pressures on our technology. These problems have been addressed in different ways and with perhaps greater degrees of success in some other democratic communities. The United States clearly has no monopoly on creativity in science and no sinecure on ways for the best utilization of such talent for improving, safeguarding and realizing a better destiny for mankind.

We need speedily to bring these issues to more objective analysis and to work out ways for improving the interdependent working relations between science and society. To this end, there is an imperative need to stop eroding and giving away the heart of professional responsibility which belongs to scientists.

Power and wealth are actively sought; technology yields power and wealth; technology is dependent upon science. Yet because of vast discrepancies in their relative costs, there is a danger that science, whenever lumped together with technology, will be conceived as riding on the coattails of technology instead of the other way around.

We need to make a fresh analysis of the role of Governmental institutions bearing directly or indirectly on science: what sufficed for a realization of ideals for democratic Government in the late 18th and 19th centuries, when science was a negligible factor in the health, welfare and defense of society, may require revision now when science has become so prominent and indispensable. It is mandatory that any institutional revisions be performed with conscious deliberation and wisdom instead of simply by improvisation. Our Government will enjoy wisdom in its councils to the degree that it can understand and foster wisdom and can distinguish this from the cacophony of limited-interest appeals. Decision making, in areas relating science to society, should be as carefully objectified as are the decisions and interpretations of the Supreme Court in the field of law.

It is evident that scientists are needed not only for the evaluations of science, of scientists and of scientific performance, but also, as participants in the difficult judgmental evaluations relating science to society. They are needed as full and responsible participants throughout the decision making processes involved in the conception and realization of society's goals. Although all of this seems patently true, when it comes to practice there are obstacles. Some of these arise out of the tendency to deprecate the scientists' training and capacity for making evaluative judgments. A second obstacle results from the expectation that scientific values are to be measured according to marketplace values; that what is scientifically "good" or "bad" is determined, as are so many other social values, by some kind of scale of popularity, through personal suasion, coercion, or appeal to external authority. Some scientists may be persuaded into a degree of conformity to this expectation, especially when it is held rather uniformly by those controlling the supports of science. Responding to such an expectation, scientists may express the goals of their scientific endeavors entirely in terms of technological and marketplace considerations. This in itself is a principal obstacle to the cultivation of high quality science. It is a barrier to understanding of the nature and scope of science by a wider public.

The degree to which scientists make use of "a tyranny of facts" or other limited-interest techniques which are foreign to a professional scientific code, is a measure of their failure to qualify properly for bearing their valid professional responsibilities. It is not so much that the facts and concepts of science need translating for the public as that the purposes and system of values of science need translating.

THE EVOLUTION OF HUMAN VALUES

Evolution, as popularly understood, emphasizes conflict as the principal fulcrum around which evolutionary progress takes place. It de-emphasizes altruism and co-operation as contributing importantly to evolution. The popular derivations from the teachings of Darwin and, indeed, of Marx and Freud as well, give us only half of our nature. Conflict cannot be put aside altogether, but as an instrument for evolution, conflict taken alone is like the odd half of a pair of scissors. An emphasis on conflict as the basis for individual or collective evolution reveals only half of our opportunity, half of our capability, and half of our responsibility.

How this notion of the significance of conflict can have become so widely accepted in the face of commonplace evidence to the contrary, how it can have magnified the acceptance of conflict as a way to the solution of problems, and how it can have secured the social acceptance of conflict to the degree that it has is beyond my understanding. It is not that Darwin, Marx or Freud accomplished this feat directly, because the popular conception embraces only fragmentary parts of their contributions. It has been simpler, and hence more popular, to believe that evolution proceeds predominantly through success or failure in conflict situations, and that an individual succeeds or fails according to his natural endowments, in which his potentialities for conflict are of paramount importance; that great social forces stem from conflict in which power, aggressiveness and wealth are principal determinants; that the individual is merely a moving atomy of conflicts, each being the victim of instinctual drives, chiefly of a gross and disagreeable nature.

A more valid thesis, I believe, is that altruism, faith, and mutual trust are built into our behavior just as surely as are the mechanisms for aggression and conflict. Each of these systems represents a vital force which has developed progressively throughout phylogeny. Each has played a central role in the determination of the freedom as well as of the survival and creative evolution of biological organizations.

Plants, which must remain relatively fixed in relation to their environments, are capable of living off fairly homogeneously distributed raw chemicals. Biological systems of discrimination upon which plants depend are concerned with relatively elementary chemical and physical factors. Animals, on the other hand, depend upon partly organized chemical substances which are heterogeneously distributed and which they must actively seek out. Animals must be able to discriminate objects in their environment which may provide suitable energy sources, and secure them for their own and their progeny's use. Animals are characteristically mobile, built for action. The evolving nervous system has been from the beginning a system that is both selective and directive. Higher animals have more complex systems for discrimination and action, and a greater capacity to learn new discriminations and new actions.

The ability to discriminate is intimately related to what we call appetite, feeling and emotion and also with mechanisms concerned in the

direction of action. Behavior is generated by motivations which are in turn shaped by biological systems of value, whether these are consciously manifest or not. Built into such differentiating-action-generating systems are mechanisms for value discriminations affecting the preservation of the individual and the preservation of the species. Both of these kinds of discriminations and actions are vitally essential. Survival and evolution could not have gone very far in the creation of complex forms of life without having a biological foundation for cooperation and altruism as well as for combat. Cooperation and faith in some degree are absolutely essential for the reproduction and survival of most offspring, and are very far-reaching in yielding internal biological satisfactions. Neither aggression nor altruism requires deliberate conscious participation, even in those organisms capable of consciousness.

We act, and live, by faith: faith in ourselves; faith in the consistency of nature; faith in each other. Every perception and every overt act is based on faith. Action follows the state of the nervous system whether it be so-called "spontaneous" action, reflex action or action of the "will." The state of the nervous system (the brain-mind) is variously called an image, an idea, a feeling, an emotion, or a judgment which in turn is based upon comparative evaluations of various images, ideas feelings, etc., built up and stored during previous experiences of the species and of the individual. Knowledge of the outside world (and of ourselves) largely evolves out of a cumulative experience which begins with our own "spontaneous" actions. Deliberated decisions---even decisions based on strong feelings of "will"---are largely founded on systems of experiential consistency and the projected faith derived from that.

To be determined by one's own nature is to be free. An educated man is said to be one able to foresee the consequences of his actions in the widest possible totality of their relationships (Kermit Eby, 1951). A wise man is most fully self-aware. He is sensitively empathic regarding the possible consequences of his actions considered in the widest context and in the longest view. A wise and resolute person has a store of stable and worthy ends, patience, and a style for engagement in action. Consciousness (and the contributions of education and wisdom to a conscious and resolute person) provides the fullest opportunity for the development and exercise of capacities

for altruism, faith and mutual trust, which nonetheless remain just as much natural and vital mechanisms as are the most primitive acts of cooperation observed in lower animals.

Freedom to act purposefully with intelligent foresight of the probable consequences of action stands as moral freedom when the social consequences of the action are taken into account. These actions are also both natural and vital. They relate importantly to survival and embody the realization of vital satisfactions. "Man's capacity for intelligently directed self-development confers upon him the ability to determine the pattern of his culture and so to shape the course of human evolution in directions of his own choice. This ability, which no other animals have, is man's most distinctive characteristic, and it is perhaps the most significant fact known to science" (C. Judson Herrick, 1956).

The brain-mind is an evolutionary tool like teeth and claws, but we can expect from it a much more creative performance. The brain-mind of man is highly developed with respect to its capacity for discrimination among objects of the environment in favor of suitable energy sources. The present uneven distribution of wealth and power throughout the world is largely due to the purposeful use of the brain-mind according to the cumulative methodology of science. Yet garnering and exploiting energy sources is not the greatest, and certainly not the loftiest, purpose of mankind. With all that the brain-mind has accomplished, it is still a very incompletely exploited instrument for contributing to the extension of freedom and to the further encouragement of man's natural capacities for altruism, faith and mutual trust.

Within the last few years, disciplines basic to neurology and psychiatry have contributed directly to a system of biological ethics that is based entirely on scientific grounds. The work of Dr. Paul MacLean is particularly significant in this regard because of his delineation of separate brain mechanisms which relate to preservation of the self and to preservation of the species. Work such as this promises to provide the first system of ethics to be developed without dogma. Scientific contributions relating to consciousness, appetite, emotion, learning, memory, motivation, value discrimination, decision making, and will are pertinent to any consideration of what we have to deal with in human nature. They

also show that human nature may be considered from a positive as well as from the more traditionally negative point of view. Such contributions, being cumulative, will provide a continuing improvement of our understanding of the limits and potentialities of all human behavior. These fields of science, although late to mature, portend to contribute more importantly than any other intellectual enterprise of man to his ultimate fulfillment in "life, liberty and the pursuit of happiness."

SCIENCE AS A HUMAN VALUE

Science itself has evolved as a valued human enterprise. The emphasis has been greatest, in this country, and especially in recent times, upon science as valuable from a predominantly utilitarian point of view. Science has proven so useful in finding and exploiting suitable energy sources, that its contributions through technology to the standard of living is taken by many to be science's chief social value. Yet those who have heard the "beep" of an earth satellite or have seen one crossing the sky, have experienced an inevitable cultural thrill through their own perceptual confirmation that man can do such a thing. This response carries with it the further recognition that the world will never be the same. Science in this way fulfills a part of man's innate curiosity. Almost all of astronomy and astrophysics, most of the earth sciences, and biomedical sciences in particular, contribute to fulfilling the innate desire of man to know, to understand, to comprehend the universe and himself. Scientific discovery ultimately has a cultural impact upon the philosophy of thought and upon the vitality of ideas. Science stresses that the individual, the community, and the universe itself, is always in the process of becoming, and that none of this transaction can be made to stand still. There is a certain anti-inertial force provided society through scientific enterprise. Science debunks authority; it emphasizes the intrinsically creative aspect of man's own life and his capacity to create increasing freedom within the total domain of organic and inorganic evolution. In many ways, science provides useful implements for cultural development.

Science is not a body of dogma: It is a way of life. The requirements of the creative process impose self-discipline and intellectual integrity. In the pursuit of science only that which can be communicated and sustained by others is retained and dignified as part of the organized knowledge of science. The process of creating new concepts

requires maximum freedom. Progressively less freedom is needed for the exploitation of available concepts, hence, for development and technology. The need for freedom, freedom in thinking, freedom in discussion, freedom to demonstrate the true nature of man and his society, freedom of publication, all required by science, is a further contribution to the strength of freedom throughout society. Acceptance of the spirit and methodology of science by society's leaders assists society in adapting to new situations without the kinds of fear which have attended drastic changes in the past.

Culture is affected by the challenge of the adventure of science, of the frontiers to be surpassed, of the beckoning effect of the unknown. Science provides concepts of enormous intellectual satisfaction, enrichment and entertainment. Science contributes to the discipline of a cultivated society and to the inspiration of its youth. Thorstein Veblen wrote in 1906 "In myth-making, folklore, and occult symbolism many of the lower barbarians have achieved things beyond what the latter-day priests and poets know how to propose. In political finesse, as well as in unreasoning, brute loyalty, more than one of the ancient peoples gives evidence of a capacity to which no modern civilized nation may aspire. To modern civilized men, especially in their intervals of sober reflection, all these things that distinguish the barbarian civilizations seem of dubious value---futile in comparison with the achievements of science. They dwindle in men's esteem as time passes. This is the one secure holding-ground of latter-day convictions, that 'the increase and diffusion of knowledge among men' is indefeasibly right and good. When seen in such perspective as will clear it of the trivial perplexities of work day life, this proposition is not questioned within the horizon of Western culture, and no other cultural ideal holds a similar unquestioned place in the convictions of civilized mankind."

TOWARD AN IDEAL DESTINY

1. Cultural differences affecting science in relation to society. A research enterprise that depends upon the patronage of a democratic society depends upon a relatively broad understanding throughout the society of the values of science and of the conditions under which science can flourish or will languish. An obstacle to such understanding is that society is made up of many different cultural groups, each of which has its own set of values and conception of the conditions necessary to its own kind of enterprise; e.g., schoolboys, preachers,

artists, salesmen, teachers, thieves, sailors, playwrights, physicians, policemen, pilots, businessmen, factory workers, television sponsors, miners, research scientists, bankers, soldiers, etc. In general, there exist only limited cross-group familiarities, although schoolboys, as a group, study teachers, and vice versa; thieves study policemen, etc. An individual in one group is likely to judge the actions of members of any other group according to his own code: indeed, he may know no other. The simplest translations are between groups whose values, actions, and conditions of work are known to each other through a continuing interaction. Yet difficult translations may be required between groups whose superficial familiarity with each other may blind them to fundamental underlying differences.

The predominant system of values and conception of working conditions in our society (at this time) relate to the marketplace. By and large, the leaders of our society understand the values and conditions relating to successful business and political enterprise. This is the code which is also most often publicly interpreted by the communications industry. This code is therefore the commonplace and primary cultural reference by which actions are interpreted. For this reason it is quite understandable, although regrettable, that a research enterprise is likely to be evaluated according to standards of the marketplace.

A further general feature of the action interface among different cultural groups is that the predominant group not only evaluates the actions of other groups in the light of its own system of values, but that it actively exerts pressures to compel conformity of action in accordance with that same system. Anything else would seem "alien" and "illogical," if not "improper," according to the code of the predominant group. This tendency is entirely natural, and it is equally unreasoned. As an example: pressures are exerted, directly and indirectly, by the predominant group of right-handed persons to disguise or eliminate left-handedness; at the very least, to require left-handed persons to adapt themselves to the way in which hands are to be shaken, tables set, doors opened, faucets turned, writing desks arranged, etc.

These two general facts of cultural interaction, compelling judgment and conformity to a foreign code, have a powerful influence upon the action interface existing between scientists engaged in research and the patrons

of science. Business and politics are competition^{VE} fields, as is science. Yet, the basis for the competition is fundamentally different. Business and politics are mainly for the purposes of social service, social power and social control. To a large degree the marketplace and public opinion determines what is correct, what measures success, and what standards of conduct must be met. Most trustees of universities and managers of business as well as most members of the Congress and Federal Executives, are men with extensive experience in the professions of business, law and politics, but little or none in the direct pursuit of science. They are, therefore, in general, well fitted to predict the social usefulness of a product, to estimate the popularity of a public policy, and to evaluate the risks and costs of an economic venture. They are culturally bound, perforce of their own code and previous experience, to evaluate a scientific enterprise in accordance with such terms. Only very rarely are such individuals experienced in judging creative scientific endeavor, scientific concepts, or the conditions essential to professional excellence in science. Moreover, because technology requires conditions that are easier to appreciate according to marketplace standards, and because science and technology are often lumped together, mistaken judgments arising out of a confusion of these two activities are unfortunately often reinforced in an individual's experience, to the obvious detriment of science.

2. Attracting the ablest scientists to an organization. There is no substitute for setting the highest standards, and for providing the greatest attraction possible, for key scientific personnel. A relatively few top-quality individual scientists can provide an aura of excellence for the entire organization that will conclusively ensure future recruitment and retention. Such individuals will illustrate the creative process, the internal self-discipline, the professional competence, and the intellectual devotion required by science. They will live out the satisfactions which derive from intellectual pursuits and set the intellectual and experimental pace for the scientific community, according to their own lights. They will ensure the establishment of traditions most suitable for individual professional development and achievement. Other scientists, whether beginners or established investigators, will draw pride from association with these individuals and their professional accomplishments.

It is clear that without substantial evidence of encouraging creative accomplishment and of providing creative individuals positions where they can accomplish

their maximum, an organization is bound to languish as a scientific institution. Without substantial professional recognition both within and outside of the organization, no other recognition is meaningful. It might be urged that since only a relatively few individuals within an organization are likely to be highly creative, it is not necessary to indulge in developing a truly creative environment; this is a ruinous misconception. If an institution is unable, for whatever reasons, to attract and to keep the precious (even though small) fraction of highly creative scientists upon whom its professional reputation depends, it can lose nothing not already lost.

When even a few highly creative scientists find that a given institution is best from the point of view of their individual professional development and accomplishment, then there are few obstacles to the administration of that organization:

i) Recruitment and retention of top-level scientists is made easy.

ii) A scientist who must leave the organization because a position can no longer be made available to him, leaves with a sense of pride in his professional experience and association with the organization; on the outside, he is a knowledgeable advocate for its scientific program and its professional support.

iii) Internal professional ideals to seek greater freedom, dignity and responsibility for the individual scientist, tend in a self-controlled, group-correcting way to elevate the standards of excellence of scientific performance entirely in the absence of administrative intervention.

iv) The stature and license of the administration as representative of this respected community of scholars becomes automatically enhanced.

v) Advocacy for the support of the organization's program becomes more objectively scientific and less political in character; this, in turn, has a strong and favorable effect back upon the professional reputation of the organization.

vi) The value system of individual scientists becomes more closely identified with the professional excellence of the organization and less concerned with emoluments; yet at the same time improved emoluments become even more evidently deserved and easier to justify and to acquire.

The ablest scientists seek an environment where limitations to their accomplishing important intellectual work will be mostly internal, where few limitations can be assigned to the environment. They seek a setting where they can have the greatest scope and freedom for both the pre-logical and the logical steps of their scientific work. The issues at stake seem intangible, but the implications reach into every aspect of daily life: does the organization buy the scientist's time and then give it back to him to employ according to his own conception of time's most fruitful utilization? What are the time-demands which distract from the main goals? Is there a tendency to short-cut significant research in favor of more tangible or "practical" results? Are salaries, promotions, and both the tangible and intangible supports of research provided according to the highest professional standards, and no others? Does legitimate professional activity need to be justified on the basis of non-scientific criteria?

It is clear beyond peradventure of doubt that these issues need to be settled by scientists according to standards of professional aspiration and professional discipline which they take responsibility for setting: no one else is suitably qualified; no one else has a higher stake in the continuing exercise of those practices which will yield the highest standards of professional excellence for the organization. These issues are similar whether the organization is under the aegis of a university, an industrial concern, or the Government. The essential value judgments in job selection are made on the basis of the professional identifications and the history of professional accomplishments within the organization. New organizations are judged on the basis of their initial program leaders, and on evidence that individual scientists can contribute in a responsible way toward an ideal destiny ^{slowly} for an institution that has not yet been bound down by ~~slowly~~ traditions, or by the even heavier yoke of mediocrity.

The ultimate level of accomplishment and performance in any scientific organization depends not only upon the techniques evolved for helping it live up to the noble ideals for which it was established, and the degree of aspiration and respect of its sponsors, but it depends in large measure upon the degree of aspiration and self-discipline exercised by its scientist members. If professional judgments hold sway (and this is essential), and if, in the aggregate, they are such as to lead to continuing internal improvement in the professional standards of the organization, that organization can withstand the impact of raids on its scientists, hence

on its life blood, by competing enterprises; it will enjoy high morale and both internal and external respect. Responsibility for high professional standards must be borne by the profession, borne with steadfast and depersonalized objectivity, aiming always toward the highest realizable levels of scientific achievement.

3. The extension of professional responsibility. Since World War II, the impact of science (as realized through technology) has outstripped most of the other forces influencing business, law and politics. In present circumstances, the leaders of society and patrons of scientific enterprise are bound to be dependent, in all of the complex and confusing decisions relating to science, upon an adventitious knowledge and judgment in these affairs which is contributed by scientists, consultants and committees of scientists. So much developmental action is possible, urgent, or even mandatory, in response to social, political and military needs now expressed and for which technology can supply partial answers provided the necessary developmental monies can be put forward, that the combined Federal and non-Federal budgets are insufficient to support them all.

How can these competing interests for technology be resolved? How can resources be safeguarded to ensure a broad range of scientific activities, upon which the future of technology depends? It is upon this jousting-ground of technical and scientific discriminations that some very large social responsibilities are being transposed to scientific and technical consultants and committees from their traditional location in the hands of business and political leaders. This may be inevitable; yet, it can be dangerous insofar as we may misperceive the extent of the transposition of responsibility, or blind ourselves to the fact that wherever the responsibility be transposed it must continue to be responsibly borne. Now, it is the scientist who finds himself in less familiar terrain. If he acts without regard to such responsibilities, or denies accepting general social responsibilities for the scientific and technical decisions he is forwarding, he becomes guilty of a failure to assume his full and proper professional responsibility. Any denial of his bearing the full implications of such responsibility is as pale as the statement of an advertising man that he bears no responsibility for the tides of public taste nor for the creation of new marketplace demands.

The displacement or transposition of responsibility in affairs relating to science and technology is taking place more and more rapidly. There is no going backward. It may be that business, legal and political leaders can learn to differentiate science from technology, and from business enterprise, and to translate objectively from one code to another. To the degree that this is achieved such leaders deserve to continue to bear in full the social and political responsibilities and opportunities yielded by science and technology. On the other hand, it may be that scientists can learn to accept and be accepted for a fuller share of social and political responsibilities relating to science and technology. This will require the scientists to bear a more difficult and baffling set of responsibilities than they have usually borne heretofore. To some degree both metamorphoses are taking place simultaneously, but as yet they have taken place to only a minor degree in comparison with the full scope of the problem. The general pattern is one of oversimplification and of artful dodging of responsibilities on both sides. A solution lies first in recognizing the facts of the convergence of several different cultural patterns into an obligatory working relationship required to solve important social problems, and second, a deliberate placing of responsibility where it can be most fittingly borne. Any attempt to eliminate the cultural differences in either direction only destroys natural intra-cultural safeguards and interferes with the development of full professional integrity and responsibility.

One reason why science may appear to be so effective in the Soviet Union is that the Russians consider themselves to have a scientific society. Therefore they encounter no conflict between social, political and marketplace criteria and the system of values and conditions essential to science. This tends to affect general features of their educational system as well as scientific and technological enterprise. In other countries one can identify further differences in respect to cultural interactions affecting science, as compared with either the Soviet system or our own. The observable differences are not suitable to advocate as worthy for use by our society, but they do reinforce the fact that any cultural interface pattern is an evolved pattern. Conscious and objective application to the problems we face and to the opportunities before us will undoubtedly identify a better destiny to set up for

ourselves. Because of our role in the world, this discrimination and the social determinations it yields will be important for mankind as a whole.

4. The ideal of professionalism. Our primary concern as scientists relates to the growth in intellectual and creative power of ourselves and our colleagues, to the improvement of our mental grasp and understanding, particularly of the more general and comprehensive theories of science. Our business is thinking. Our products are conceptual, intellectual. The serious pursuit of new knowledge provides a special kind of discipline, different in important respects from that of any other intellectual calling. What scientists seek is the development of improved concepts that will possess pragmatic intellectual value and will stand testing against all valid sense experiences. The intellectual value concerns whether the concept provides a greater generalization or simplification of ideas, or whether it accounts more explicitly for the facts it relates. Although in biomedical science we can point to tangible evidences of progress in terms of new enzymes, new germs, and new therapeutic agents, these are by-products yielded through the pursuit of less tangible goals. A new level of understanding can be brought about either by beginning with the investigation of explicit problems (a particular disease entity, or a given sick person) or through the investigation of general problems (the mode of physical-chemical action of enzymes, or how information may be genetically transmitted). In either case, an important cue to the scope of the ultimate scientific accomplishment is found in the admonition: "There is no harm in studying a special subject: the harm is in doing any kind of work with a narrow aim and a narrow mind" (J. Hughlings Jackson, 1877).

There is no such thing as a logic of creativity: the creative process is really pre-logical. The expository order of explanation as to what we have accomplished in science, and how we have tested our ideas, conceals the actual order of discovery. Logical features of science are essential for the logic-tight testing of new concepts against sense experiences. Yet the logical features of new concepts cannot be cleared up until the solution to the problem is evident. Not only is it necessary, in order to be creative, to be rid of interfering precommitted opinions and prior assumptions, but the experience of creative work makes it increasingly difficult thereafter to hold provincial views. Scientific knowledge, and with it the truly professional scientist, can weather the

shattering of its own fictions. Its power is such that it will defeat systems of thought that rest upon suasion, coercion or the exclusion of experience. The pursuit of new knowledge has therefore a liberating as well as a sternly disciplining influence on the individual and on his community. Pessimism and insecurity, and a lack of confidence in being able to do something worthwhile in the arable field of science because of externally imposed limitations brings with it a decay of intellectual and moral fiber. Professionalism declines along with the decaying of intellectual standards.

The pursuit of professional excellence, like the pursuit of scientific knowledge is ennobling and liberating as well as discipling. It is also everlasting. Changes in the character of the scientific frontier, changes in the socio-economic and socio-political context in which the enterprise is conducted, changes in the personnel of scientists, administrators and sponsors, all contribute to a dynamic transaction in which failure to be reflective and self-critical, individually and collectively, can lead to the establishment of practices (by direction or by default) that are likely to have devastating consequences for both the individual and the organization.

What seems to be required is a restitution of an ideal of professionalism as practiced, for example, in the guilds. By this is meant an increased sense of personal dedication, greater sense of individual responsibility to one's own work and to the work of one's colleagues, an enlarged sense of identification through individual and group accomplishment, a bigger thrust of pride in the mastery and exercise of professional skill. This attitude is clearly to be distinguished from the despairing concept of an impuissant, helpless cog, the contemporary dirge of one's being an "organizational man." The degree to which a scientist's professional code of action, experience and responsibility is disallowed, obstructed or diverted by his surroundings, and the degree to which a scientist permits this to take place, measures certain inevitable losses of professional power and professional integrity. The only real safeguards of excellence in the conduct of research depend directly upon the professional characteristics of initiative, self-discipline, and what might be called a "creative temperament." These characteristics cannot be supplied from the outside. They can, and often are, however, eroded and given away. It is not the hazard of the avalanche that ruins scientific enterprise; it is the slow bit by bit loss of professional ideals. Ideals, by embodying themselves in institutions, become enduring historic forces. "An ideal is a picture of

the place you will never quite, but always strive to reach. Its attainment happens in little pieces of the striving...in any one small piece of honest intellectual exchange, with my neighbor, with my book.... a new beginning toward the unattainable is forever right at hand" (Robert Redfield, 1955).

REPRISE

Biological and social evolution has gradually achieved greater degrees of obligate cooperation and interdependence within the individual, family, organization and society. Although each step of this progression has been at the expense of certain arbitrary modes of selfish behavior on the part of the individual, family, organization and society, this petty constriction has been counterbalanced by substantial gains in freedom and self-determination at each of these levels. The progressive gains can be appreciated readily through an examination of comparative physiology and behavior, and through an examination of the facts of history over a time scale of centuries. The resultant achievements have meant substantially greater degrees of freedom and self-determination within a widening framework of cooperation, faith and mutual interdependence. This finds its expression in many phenomena: increasing urbanization, increasing dependence upon federated activities and increasing mutual interdependence on the international scale. Nonetheless, developments are not always and uniformly in the direction of enlarging spheres of interdependence: in the field of international travel and exchange, there has been a half century of deterioration in formalities which is not entirely offset in practice by technological improvements.

It is patently true, in the aggregate, that never before in the history of man have there been so many individuals, families, organizations and societies so inextricably interdependent. The generalization is illustrated everywhere one looks: tool manufacturing, heavy industry, labor unions, the communications and transportations industries, the interdependence of universities and the Federal Government, and many other larger and lesser examples. The assumption of interdependent relations, whether contracted by individuals, members of a family, organizations, a given society, or assemblies of nations has often been urged and been identified on the basis of narrow motives and as a fulfillment of narrow and provincial interests. The extent

to which this narrow view obtains is regrettable; it represents an unwholesome and incomplete recognition of larger relationships.

The situation can be improved through the encouragement and development of healthier and wiser motives and aims, on the part of the individual, family, organization, society and international confederation. This demands the assumption of more extensive responsibilities at each level, the attempt to be rational about more complex equations, the continuing search for, and endeavor to achieve, a higher level of integration. Far from this being contrary to nature, it is in fact an extension and more adequate representation of vital principles that are active throughout all of life. These principles operate to allow increasing degrees of freedom and self-determination. These principles are susceptible to a vast acceleration of their effect through conscious acceptance of them as they apply to social existence. After all this is only the centennial of man's achieving a working conception of biological evolution.

Does man have freedom to manipulate the channels between his ideals and his actions? Can he choose his purposes? Research in the mental and neurological fields now supports the surest evidence in this regard that has ever been put before mankind. Opportunities of consciousness and the degrees of freedom of will are now known to be greater than we had any reason hitherto to believe. Freedom of choice and opportunity are ours. We need to utilize these not simply out of anxiety for individual or societal security, but for far more positive reasons --- reasons that take into their scope the whole of mankind. Freedom of the individual, family, society and species has been increasing over the centuries, and now, with the advantages of new insights, with incentives sharpened by the prospects of tragic and debasing alternatives, this freedom can be greatly extended by the individual, the organization, the society and the species. This requires only a wider recognition and release of a vital biological heritage which has brought us to the present level of evolution and understanding. It needs only the wider recognition and release of natural tendencies toward altruism, faith and mutual trust.

To be free is to be determined by one's own nature. This refers equally to the individual, family, organization, society, or mankind as a whole. A wise and resolute exercise and increase in man's freedom through this means is the most direct way to liberate ourselves from the undesirable exercise of our own baser tendencies. Such an effort can effect changes in our lives that will immeasurably forward us in "life, liberty,

and the pursuit of happiness." Are we too blasé to take seriously the high-hearted language and aspirations of our forebears? If we take such goals seriously, do we think that there is some easier or more direct way for their realization?

LONG RANGE INTRAMURAL PROGRAM DEVELOPMENTS

1. The Assembly of Scientists, NIMH-NINDB. The idea that there should be some kind of "faculty" organization at the National Institutes of Health is probably as old as the idea for the establishment of the Institutes. Such an organization would serve as a general forum for improving communication among the scientists, as a means for the formulation and expression of opinion by the scientists, and as a mechanism for rendering advice and taking action to promote professional excellence and scientific achievements. As Dr. Seymour S. Kety pointed out a "faculty" organization would provide the scientists as a whole with the same freedom of conscience and freedom for expression of opinion that has already long been afforded individuals. It would encourage an increase in the sense of participation and responsibility within the profession of scientists at the NIH in the same way that this has been cultivated by the great universities.

Clearly, the long range goals of the Institutes are inextricably bound up with the worthiness of its scientists; and the professional careers of the scientists are inextricably bound up with the reputation of the Institutes. For two years the Laboratory Chiefs of the Basic Research Program, NIMH-NINDB, devoted their twice-monthly meetings to a discussion of the relative values of such a "faculty" organization and of ways in which the idea might be democratically put into effect. During this period Dr. Kety provided a further notable contribution by recommending the examination of a model faculty organization, the highly effective Faculty Senate of the University of Pennsylvania, established in 1952.

In the Spring of 1958, following thorough discussion with the Branch Chiefs of the Clinical Investigations Programs of NIMH and NINDB, and after discussion in Executive Staff Meetings within the two Institutes, the matter was brought before the Scientific Directors for consideration as an all-NIH "faculty" organization. The Scientific Directors suggested that a trial of the idea should be made among the scientists of the two initiating Institutes; if, after a period of experience, the results seemed to be worthwhile, the plan could be considered for wider adoption

within the NIH. The conception of an "Assembly of Scientists" was thereafter presented before an open meeting to which were invited all scientists of the two Institutes. Yet, it was another full year, until the Spring of 1959, before the Assembly was finally launched. At a second open meeting of scientists of the two Institutes Officers pro-tem, Dr. Hal Rosvold as Chairman and Dr. Karl Frank as Secretary, were elected by secret ballot following open nominations from the floor. There was a unanimous expression of interest, in principle, in the establishment of an Assembly of Scientists. The Chairman pro-tem was instructed to appoint a Committee to draft a Constitution which would then be presented to the scientists. In due course a Provisional Constitution was adopted, and in the Fall of 1959 a revised Constitution was formally adopted by a mail vote of 230 members of the scientist staff of the two Institutes. They also expressed their wish voluntarily to participate in future activities of the Assembly.

As far as is known, such a "faculty" organization within the Government is without precedent; yet this is not surprising in view of the fact that the National Institutes of Health are themselves without parallel in mission or spirit of organization within the Government. The potential value of this Assembly to the ultimate stature of the Institutes, and to the level of professional regard in which the scientists themselves will be held, is limited only by the vision, determination and willingness of members of the Assembly to assume individual and collective responsibility of a constructive nature. Through the Assembly they have a unique opportunity to create an example for scientists elsewhere at the NIH and more generally throughout the Federal Government.

2. The Principle of "Tenure." Although employment security in the Government is accorded employees in all categories after only one year of employment, one year is too brief a period in which adequately to develop or evaluate the skills of junior scientists. If tenure were to follow automatically in each instance of a scientists working for a full year at the NIH, three disagreeable alternatives would be forced: i) either the Institutes would have to be expanded indefinitely, or ii) there would be inadequate space for essential research operations after only two or three years of such practice, or iii) there would be no opportunity to provide research training for aspirant scientists. Since the most effective scientists are often asked to fill attractive research and teaching posts elsewhere, there is a continuing risk of losing the best research talent from the Institutes, the very leaders with whom aspirant scientists seek to study, the ones who chiefly account for the professional reputation of the

Institutes. It is therefore imperative for safeguarding the professional stature of the Institutes, the opportunity for scientists to pursue research effectively, and for junior scientists to receive an adequate foundation in research training, that all of the scientists participate in a definite plan whereby the younger scientists can be provided training and experience in research for definite but limited periods of time, e.g. for from two to three years. Although this period might be extended for an additional year in exceptional cases, that would ordinarily be the final limit. The only possible exceptions would occur on the occasion of vacancies resulting from the retirement or departure of senior scientists. "Tenure" is therefore to be effected by establishing a firm understanding, prior to the employment of a new junior scientist, of the time-limited nature of his appointment opportunity. The practice of a policy of "tenure" is so standard throughout the academic world that it is widely understood and respected by scientists. Such pre-vision precludes the embarrassment and misunderstanding which otherwise may arise among scientists, each of whom is devoting his utmost energies to research, and for whom, inevitably, there can be only limited local research resources.

3. The Principle of "Sabbatical" Leave. Creative scientific endeavor demands a mastery of subject matter and the exercise of initiative, self-discipline and personal devotion at a level that cannot be sustained indefinitely without intellectual refreshment and revivification. Anyone attempting highly creative scientific work, with the intense preoccupation and internal involvement that this entails, tends to "go stale" without periodic relief in the form of recurrent opportunities to renew their mastery of the field, to learn new technical and conceptual skills and to obtain a new perspective on scientific values relating to their work. To some degree this kind of "change in pace" is effected by the individual investigator within his normal working pattern; nonetheless, over a span of years, he is likely to become even less aware of the conceptual strictures which may impoverish his accomplishing more effective and creative endeavors. Universities of high standing have long recognized as prominent among the essential requirements for sustained high quality creative scholarship the need for their senior faculty members to be given extended periods of time away from regular duties, usually at seven-year intervals.

The Laboratory Chiefs of the Basic Research Program initiated discussions on this subject and were encouraged by the Director of NIMH, Dr. Robert H. Felix, to draft plans for a "Sabbatical" Leave Program. Under the chairmanship of Dr. David Shakow, an NIMH committee established the essential

administrative considerations for such a Program which was then endorsed, in principle, by Dr. Felix, and Dr. Pearce Bailey, Director of NINDB, and by the Scientific Directors. Authority for this practice is found in existing regulations providing for the Work Assignment and for the Training of Institute scientists. The "Sabbatical" Leave Program will provide the senior scientist belonging to the permanent staff, upon whom the Institutes stake their research mission and reputation, an opportunity at seven year intervals to engage in sabbatical activity of their own choice. Dr. Harris Isbell was the first scientist to be sent on this new Leave Program; others in the two Institutes are already on leave or are proceeding with plans for participation in this augmented opportunity for personal intellectual growth and career development in preparation for further creative work at the National Institutes of Health.

4. Educational Programs Relating to the NIH.
"Scratch a scientist and you will find a teacher." An important aspect of professional activity is helping others to acquire intellectual and technical skills and to have experience in the extension of these skills to new frontiers. The most characteristic form of such "profession" takes place between scientist-preceptors and their junior colleagues. Nearly every collaborative research undertaking involves similar vital intellectual exchange, a function intrinsic to the life of an investigator.

Early in the history of the National Institutes of Health there was an expression of need for more formal and organized opportunities for participation in both directions in the educational process. The NIH established a branch of the U.S. Department of Agriculture Graduate School which has grown steadily in attendance and autonomy. The Research Associates Program, established three years ago, has added to the preceptor-apprentice relationship complementary means for a broad-based education in bio-medical research, through the provision of course work and seminars extending into fields other than the Associate's primary specialization. This last year members of the NIH Scientific Advisory Committee established a non-profit corporation, The Foundation for Advancement of Education in the Sciences, Inc., which will facilitate a further extension of educational opportunities at the NIH. Dr. Daniel Steinberg is Chairman of the Board of Directors of the new Foundation. The Board also includes other representative leaders in the field of science education outside the NIH. The Foundation, like the Graduate School Branch it takes over, will be largely self-sustaining from tuition. The increase of intellectual experience which the Foundation can provide will undoubtedly prove beneficial to the recruitment and sustained intellectual vigor of scientists

who derive insight and satisfaction from participating in professional educational activities.

5. The construction of a greenhouse facility. For several years scientists in the Laboratory of Cellular Pharmacology have expressed their need for a facility for direct investigation of alkaloid synthesis in plants. During the year a neat little greenhouse was constructed and put into operation under the direction of Dr. Harvey Mudd. Several alkaloids, particularly those related to groups of tranquillizers, psychotomimetic drugs, narcotic agents, depressives and cerebral stimulants can now be studied in relation to their metabolic precursors and the ways in which they are handled and inactivated by plants. It will also be possible to label complex compounds by feeding plants with radioactive building blocks, by this means, in many cases, saving difficult laboratory synthetic procedures.

The first procedures undertaken by Dr. Mudd and his colleagues have established certain common features of metabolic pathways which are common to higher mammals, single celled organisms and higher plants. This revelation confirms that it will be practicable to examine a number of complex metabolic pathways first in plants where the growth and harvesting of large quantities of particular metabolic steps will facilitate the solution of a number of important problems. With certain key steps established in plants and with knowledge of the essential substrates, enzymes, cofactors, etc., it will be possible to confirm and extend these findings much more quickly in higher mammals. Members of the laboratory will now be able to work back and forth between plant and animal biochemistry and to look for variants and consistencies over a very broad biological field of endeavor.

GENERAL COMMENTARY

This year has witnessed a continuing harvest of outstanding research papers from the Basic Research Program. The entire enterprise can be readily justified on the basis of a few of the really creative ideas brought forth. The status of the Program is also measured by the large number of invitations which come to its scientists to provide papers for national and international meetings, and to lecture before or to join the faculties of outstanding universities. Judging by the increasing qualifications of scientists seeking position here, it is evident that the Program is gaining in reputation as an intellectual and experimental resource for effective

scientific training and experience at all levels. Nearly every major university in this country and some seventeen foreign universities are represented by one or more scientists employed in the program this year.

Dr. Mortimer Mishkin was sent to work for three months at the Nencki Institute in Warsaw, Poland, and Dr. Stefan Bratkowski of that Institute has been sent by the Polish Academy of Science to work with Dr. Mishkin and Dr. Hal Rosvold for about a year as a Guest Worker. Altogether sixteen of our scientists were sent abroad for periods of work and intellectual exchange during the year. There were nine scientists in the Program who attended international meetings outside this country. Distinguished scientists from more than twenty different countries visited the Basic Research Program this year.

One of the traditional ways of improving the creative power of an organization --- through the use of expert consultants --- has been actively exploited this year as in the past. The twelve members of Boards of Scientific Councilors of the two Institutes, NIMH and NINDB, have continued to give encouragement, intellectual stimulation and to provide programmatic as well as scientific advice. Some thirty seven other expert consultants participated and advised in relation to special aspects of the Program. Professor Torsten Teorell of the University of Uppsala, Sweden and Professor Ulrich Franck of the Max Planck Institute in Darmstadt, West Germany came to work for a period of time with Drs. Ichiji Tasaki and Constantine Spyropoulos at the Woods Hole Marine Biological Laboratory this summer. Similarly, Drs. Sydney Brenner and Francis H. C. Crick from Cambridge, England, paid working visits to Dr. Bernhard's Section on Physical Chemistry. Altogether about a dozen foreign scientists spent working periods in the Program. Through a chance encounter with Dr. Emanuel Piore, Director of Research for the International Business Machines Corporation, an exceptionally exciting research collaboration has been arranged. Dr. Sidney Bernhard introduced a group of engineers and mathematicians of the IBM Research Division, visiting Bethesda at Dr. Piore's suggestion, to the conceptual problem of "breaking the code" for the nucleic acid sequencing of amino acids in genetic transmission, and more generally in all protein synthesis. Dr. Bernhard and Dr. Dan Bradley had conceived of a way in which the bulk of the presently tedious chemical identifications of one after another of the amino acids in serial order could be short-cut by utilizing advanced electronic computers in elaborate logical analyses. Dr. William Duda of IBM has since then been devoting full time to the difficult mathematical end of this investigation. He has been able to put to work the best IBM computer programmers and to commit the most modern computer equipment for this purpose.

In September Dr. Duda accompanied Dr. Bernhard to Copenhagen to participate in discussions on this subject at the International Symposium on the Genetic Control of Protein Synthesis. Dr. Bernhard had been invited by the Symposium Program Committee to give an address at the Symposium in replacement of Professor Linderström-Lang, an internationally famous Danish scholar noted for his work in this field, who died unexpectedly last Spring.

The project to "break the code" of amino acid sequencing by this means is still in early stages of development. Each step thus far has proceeded favorably, but it is a "long shot" as to whether the concepts and techniques may prove successful: nonetheless, both IBM and the Basic Research Program are confident that whatever is learned along this important line of investigation will be worthwhile. Whereas it now takes years of conspicuously conscientious and compulsive chemical work to determine the sequence of amino acids in even relatively small proteins, the new method shows promise of reducing this time to a matter of a few weeks. If this turns out favorably it will vastly accelerate the analysis of differences in the almost countless proteins of importance to biology and medicine, and it will make practicable the identification of the sites of defect of genetically determined developmental and metabolic errors.

During the year Professor Leo Szilard published the theory of aging which he developed while serving as a Consultant to the Program. He now has in preparation two new and equally challenging papers on the theory of antibody formation. After long deliberation, Dr. Szilard declined employment in this Program in favor of accepting a long-term NIH extra-mural grant which will allow him to retain his post at the Enrico Fermi Institute in the University of Chicago and still collaborate with our staff for extended periods as a Guest Worker. Unfortunately, the same week that Dr. Szilard was informed of favorable action on the NIH grant, he also learned that he has a highly malignant tumor which is effectively inoperable.

A PERSONAL NOTE

Prior to appointment as Director of Basic Research for the two Institutes, I discussed with everyone concerned deliberate limitations on the length of time I felt it was reasonable to commit to such heavy administrative responsibilities. This year, shortly before the completion of three years in office, I asked the two Institute Directors' permission

to be relieved from this work "in the near future." My reasons for adhering to such a time limit are threefold: First, I believe it is desirable for a scientific program to have a change in leadership from time to time. Dr. Kety has already set a precedent for this. Any leader of a research group has conceptual limitations which are likely to become an increasing interference to the program as his time in office is stretched out beyond about three to five years. Second, as Ian Stevenson puts it, "The possession of the power to make decisions can eventually persuade anyone that he also has the proper knowledge to do so." My third reason for wishing to adhere to such a time limit derives from a very personal desire to continue full-time research.

Robert B. Livingston

Robert B. Livingston, M.D.

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November 9, 1959

TO : Director of Basic Research, NIMH-NINDB
Director of Clinical Investigations, NIMH

FROM : Chief, Laboratory of Psychology, NIMH

SUBJECT: Annual Report, 1959.

Since the introductory section of last year's report discussed at some length the general pattern of the ongoing and projected program of this combined Laboratory, I shall keep my introductory remarks brief this year. The six major areas of research remain the same: the psychophysical parameter, aging, child development, creativity, psychotherapy, and schizophrenia. The progress of research in these areas, as well as in some other areas, are well described in the reports of the several sections.

An encouraging development in our personnel program during the past year has been the increasing participation of post-doctoral fellows. At the present time we have seven such fellows -- 6 American and one Polish. They are working effectively in the Sections of Animal Behavior, Perception and Learning, Child Development and that of the Chief. In addition, Dr. Daniel C. Berlyne, a well-known English psychologist, is spending a year with our Laboratory as a Visiting Scientist.

The reports of the several sections of the Basic area are presented in this order: Animal Behavior, Learning and Perception, and Aging.

Section on Animal Behavior:

As has been indicated in previous reports the research of the Section (Drs. Rosvold, Mishkin, Mirsky and the various fellows) has been concerned with (a) defining the behavior served by association cortex in monkey, chimpanzee and man (b) determining the neural mechanisms underlying this behavior and (c) specifying the neural mechanisms of attentive behavior in man. These goals have increasingly involved studies designed to elucidate the interaction within the association areas, and between these areas and the basal ganglia, hypothalamus, and brain stem.

Earlier findings that, unlike monkeys, chimpanzees with damaged frontal lobes recover from an initial deficit on delayed-response problems have been confirmed in additional animals. Since, in a sense, the chimpanzee has a partial deficit in this behavior, he has been a particularly good subject in which to manipulate variables which may affect delayed-response behavior quantitatively. Early results suggest however that it should be possible to specify which variables may be manipulated in the delayed-response test to increase its difficulty such that the chimpanzee's postoperative performance, like that of the monkey's, will be completely and permanently impaired.

Behavioral studies with monkeys have also revealed something of the nature of the deficits following frontal-lobe damage. Findings last year suggested that monkeys with such damage are impaired in their ability to inhibit responses whether or not a delay is involved. More recent studies suggest that this impairment is quite general, in the sense that frontal animals have difficulty in inhibiting any strong response tendency which develops as a result of training, preference, or novelty and appears whether the response is dependent on visual, auditory, or tactual stimuli. An interpretation of these findings leads to the notion that in the frontal animal some on-going central process gets locked in and occludes others. Behaviorally, the animal develops a set to respond and perseverates this set to the exclusion of others. Further research will attempt to set up critical tests of this notion.

Earlier work based on limited information provided by results on delayed-alternation testing had suggested that the effects of frontal lobe lesions are similar to those of lesions in the head of the caudate nucleus. Research this year has extended the information to other types of delay problems, and to auditory tactual and visual learning tests. The results have been consistent in showing that the effects of caudate lesions while quantitatively less severe are qualitatively similar, to those of frontal lesions. Preliminary results of special histological studies using Nauta-Gygax silver staining procedures suggest that the behavioral similarities following damage to these two structures may be accounted for by the anatomical connections between them which have now been demonstrated.

Section on Animal Behavior (Cont'd)

Last year a study was completed which appeared to implicate the splenium of the corpus callosum in delayed-alternation performance. More recent studies, however, indicate clearly that this is not so. The earlier effect appears to have resulted from damage either to the posterior columns of the fornix, the mid-line thalamic structures, or to some yet unsuspected structure. On-going research is attempting to determine which of these structures are in fact involved.

Earlier work had demonstrated that damage to the medial temporal lobe structures changed an animal's social behavior and suggested that the change was dependent upon environmental as well as anatomical variables. No further studies have been conducted in this area during the past year because of lack of technical assistance. It is hoped that this area may be explored further.

Investigation of the role of the inferotemporal cortex in vision continues as a major effort of the section. A recent study in the literature questioned the specificity of the inferotemporal-visual relationship, suggesting that not only inferotemporal but also other temporal neocortical areas serve visual functions, and that these areas serve not only visual but also olfactory functions. A special study undertaken to reinvestigate this problem provided no support for these suggestions, but confirmed instead the original thesis that the focal area for extrastriate visual processes is the inferotemporal area and that damaging this area produces an impairment that is specific to the visual modality.

It was hypothesized on the basis of earlier work that the inferotemporal area is connected with the primary visual area mainly, if not exclusively, via cortico-cortical connections. This conclusion derived from an experiment in which the cortico-cortical connections between an intact striate area in one hemisphere and an intact inferotemporal area in the opposite hemisphere were cut by the complete sectioning of the corpus callosum. This procedure produced an abrupt and severe decline in visual performance. An extension of this study, now in its early stages, demonstrates that the same impairment may be produced by sectioning the posterior third of the callosum only, whereas sectioning the anterior third is without affect on visual performance. On the basis of these results a detailed picture of a sensory-associative visual system is beginning to emerge. Concurrent anatomical studies, using the Nauta technique for staining degenerated fibers following selective cortical ablations, fully confirms this picture.

Section on Animal Behavior (Cont'd)

The behavioral analysis of the visual impairment produced by inferotemporal lesions has depended until recently on work with monkeys trained by discrimination techniques. In an attempt to broaden the approach new studies have now been initiated using generalization techniques and the studies designed to extend the analysis to chimpanzees and man are continuing.

The encouraging results obtained thus far in the analysis of the inferotemporal-visual relationship suggest an extension of the program for the purpose of investigating sensory-associative systems in other modalities. With this as a goal, work has begun on developing satisfactory sensory discrimination and generalization tests in audition, somesthesia, and olfaction.

This year a new project has been developed to attack directly the problem of relating learning to brain function. The first step has been to establish base-line measures for continuous and periodic food-getting and water-getting responses in the monkey. The next step has been to compare these measures with those obtained by electrically stimulating through implanted electrodes the ventromedial and later hypothalamic areas (which are known to be reciprocally related in regulating eating and drinking). The third step has been to study the effects on the electrical activity in these structures of food and water depriving and satiating the animal. This phase of the study is in its very early stages, but preliminary results are encouraging. The next step, if the first two are successful, will be to study the changes in these measures as the learning of an alimentary conditioned response takes place in order to determine if a change in the activity of these brain centers occurs as the unconditioned and conditioned stimuli become related in the process of learning. The long range goal of this study is to gain an understanding of the function of the hypothalamic hunger mechanisms in motivation and learning.

The studies of attentive behavior in man during the past year has continued to involve detailed study of epileptic patients with presumed subcortical pathology and patients with electrodes implanted in the temporal lobes. The abnormal electrical activity of the former group may interfere seriously with attentive behavior; that of the latter group does not. Approximately 15 patients with presumed subcortical pathology have been studied exhaustively from the standpoint of phasic interruptions in their ability to perform sustained vigilance tasks. Simultaneous with the behavior, the E.E.G. and seven different autonomic functions have been monitored. Present efforts are directed towards encoding the obtained information and analysis of the relationships among the several behavioral and physiological variables.

Section on Animal Behavior (Cont'd)

Supplementing the study of neurological patients has been the investigation of those conditions in normal individuals which produce impaired attentive behavior. Thus, behavioral, E.E.G. and autonomic variables have been studied in a group of ten normal controls under the influence of prolonged sleep loss and of the drug chlorpromazine.

The research conducted to date suggests certain broad similarities and striking differences among the effects of agents which impair attentive behavior. Studies are currently being planned to test some of the anatomical-behavioral-autonomic relationships suggested by the information that has been obtained.

The special work of the fellows calls for mention. Dr. Elinor Brush is terminating her NIMH post-doctoral fellowship having accepted a position with the Research Grants Division of NIMH. She has completed several related studies and is now in the process of writing them up. The result of these studies has been to demonstrate the important point that frontal animals have difficulty freeing themselves from the effects of response tendencies. Thus, in tests where such a tendency favors solution of the test, they will appear superior to other operates; where it hampers solution they will appear inferior. Dr. Karl Battig returned to his post in Zurich having completed several studies comparing the effects of caudate and frontal lesions. One of these has been submitted for publication, the others are being written. The result of these studies has been to demonstrate that the effects of these lesions are qualitatively similar suggesting that a strong anatomical relationship exists between these structures. Dr. Bryan Robinson, Research Associate, joined the Section in April and has been engaged in research with Dr. Mishkin analyzing the electrophysiological correlates of a food-getting response. This problem has required setting up considerable electrical apparatus and the development of new techniques in which Dr. Robinson's specialized knowledge has been particularly useful. Dr. Charles Butter, NIMH post-doctoral fellow, arrived from Duke University October 1. He is setting up apparatus to study the effects of brain lesions on stimulus generalization as a method for analyzing more systematically the discrimination deficits which follow inferotemporal lesions. Dr. Stefan Brutkowski arrived from the Nencki Institute, Warsaw, 15 October. He expects to acquaint himself with the anatomical, surgical and testing techniques used in this country in brain-behavior research with monkeys, and to participate in problems of the Section involving the neural correlates of conditioning.

Dr. H. Kuypers has continued to consult one day a week with us on anatomical problems. His help has enabled us to answer some very important questions with respect to the anatomical relationships between various parts of the visual system, and between the head of the caudate nucleus and the frontal cortex.

Section on Perception and Learning:

The research of the section may be most generally characterized as an approach in which experimental design is related to theory which is explicitly addressed to explanations of perceptual and learning processes as they occur naturally. Present behavioral theories have not been sufficiently cognizant of the artificial aspects of many of the experimental situations used to define basic theoretical constructs. The result has been defects in generalizability, which in many instances may call for changes in fundamental theoretical assumptions rather than mere accumulation of further data in more naturalistic settings.

Existing theory and data in the field of sensory psychology may be particularly open to question in this respect. There are a number of findings available to suggest that many of the data of the traditional reduction type of experiment reflect the operation of the observer's assumptions, attitudes, and language habits rather than elemental sensory processes from which perception is presumed to be elaborated. Instead, many perceptual phenomena which have been interpreted as cognitive or judgmental may be more directly characterized as conditioning-adaptational processes not given in conscious experience.

Size constancy appears to be an appropriate paradigm for exploring the usefulness of these considerations, involving as it does both sensory and perceptual aspects in the generally accepted meanings of those terms. This phenomenon refers to the empirical observation that perceived object size remains approximately invariant with variations in the distance of the object from the observer. It is a relationship which obtains under more or less natural environmental circumstances but not in certain experimental situations. Dr. Carlson is at present concerned with determining whether deviations from size constancy have a plausible explanation in terms of the attitudes and motivations which are inherent accompaniments of these kinds of experimental situation. If so, then a sound basis for the dependence of perceived object size on proximal stimulation is not sensibly to be found in the experimentally produced deviations which have in the past been interpreted as representing the sensory underpinnings of perceptual constancy. The development of a functionally and theoretically suitable experimental situation for investigating size constancy in relation to impinging stimulation is planned as a future project in this research.

Two other current studies are more directly concerned with the dependence of perceptual response on adaptation to various kinds of stimulation. During the past year Dr. Feinberg, of the Laboratory of Clinical Science, and Dr. Carlson have been involved in setting up a situation for determining (a) the relationships among kinesthetic adaptation, visual figural aftereffects, and adaptation to perceived

Section on Perception and Learning (Cont'd)

curvature, and (b) whether these relationships have a perceptual or extra-perceptual basis. Possible extra-perceptual vehicles for apparent relationships exist in the form of varying motivational reactions to the situation and varying degrees of eyemovement control. A good deal of preliminary work has been necessary in order to arrive at satisfactory experimental procedures for getting at these questions, and the experiment itself will be started shortly.

The second study of this kind is directed toward the measurement of adaptation to visual motion. The perceptual response to the cessation of a regularly patterned visual motion is an impression of motion in the opposite direction. It is a peculiarly difficult effect to measure, and no altogether satisfactory means has hitherto been devised. A most promising method, however, appears to be a test of perceptual velocity recently developed in the exploration of after-effects of sensory deprivation and adaptation to visual noise. Some parametric investigation of the test itself has been accomplished, and apparatus is being modified for use in determining the sensitivity of the test to adaptation to visual motion.

The animal research program conducted at the Rockville Farm by Dr. Calhoun has been concerned primarily this past year with problems in which group size operates as a variable in the accommodation of the individual to a complex set of environmental stimuli.

Two long-sequence studies have been completed on the relationship of group size to learning in two different social interaction problems. One of these situations required the proximity of two individuals in order for either to be rewarded, while the other required that only one rat be present at the response situation for a reward to be received. The former situation is designated "cooperative behavior" and the latter "disoperative behavior". Concerning cooperative behavior, the smaller the group size the greater the initial number of errors along with a rapid rate of learning. The larger the group, the fewer the initial errors but the slower the rate of learning. This trend arises from the fact that in the cooperative situation the larger the group the more opportunity there is for reward purely on the basis of random activity.

The learning of disoperative behavior, which is really learning to avoid interfering with the activities of another rat, is much more complex. In general, the smaller the group the fewer the initial errors and the slower the rate of learning. However, at large group size in which initial errors are high but rate of learning is rapid, the learning is still sufficiently slow so that, where the reward is water, there gradually accrues a deficit in the water balance. At this point the motivation to secure water or to respond to the lever pressing situation

Section on Perception and Learning (Cont'd)

completely cancels out prior learning and produces a situation in which individuals stand side by side at the lever, even though this blocks the opportunity for obtaining a rewarded response.

Initially as a chance observation and subsequently by design, it has been observed in several studies in which social groups of rats are maintained that wherever there is a high probability of two rats being in close proximity while being rewarded, the response situation develops a new definition which requires the presence of another individual. The other individual appears to serve as a secondary reinforcement, and few rats in the group will respond at those places or those times when other individuals are absent. Eventually such altered patterns of response lead to highly pathological social aggregations. These aggregations are pathological in the sense that the presence of other individuals in great numbers interferes with the execution of sequences of responses which form a behavioral unit. In extreme situations the aggregate actually interferes with any one individual securing the reward; and, in fact, this may lead to such an extreme deficit, that where the reward is physiologically necessary most of the animals in the group die.

Another observation is that the average duration of drinking has been modified as a result of the social conditions relating to group size. For this reason Dr. Calhoun suspected that the duration of such behaviors might be the deoscillator in Pittendrigh's theory of biological time clocks. If this is true, the degree of alteration in the twenty-four hour cycle when the rats are in a condition of continuous darkness should be correlated with the average duration of behaviors. This study has just been completed, and it can only be remarked at present that there were clear differences in the alteration of the twenty-four hour cycles among individuals and this line of attack looks promising in a further understanding of mechanisms of biological time.

Dr. Kyle Barbehenn, working with Dr. Calhoun as a post-doctoral fellow, has largely been concerned with the influence of litter size on later selection of places of habitation or places of visitation as these differentially offer opportunity for contact with other rats. Of several places to which rats had free access, those individuals who were members of small litters tended to seek out those situations in which contact with other individuals was minimized. On the other hand, rats who were members of litters of size twelve tended to maximize opportunity for contact with other individuals. The general conclusion from this study is that an individual rat in later life will seek configurations of stimuli in harmony with those it experienced as a very young individual.

Section on Aging:

The Section on Aging is organized to study and gain understanding of aging as a pervasive natural phenomenon. The general intent is to observe aging in both animals and humans with the aid of experimental methods in order to reveal and characterize mechanisms of biological and psychological interaction of general scientific importance. Through the research and theoretical efforts of the staff members of the Section the subject matter has undergone what in retrospect seems to have been a rapid transition from a descriptive naturalistic phase into a more tightly organized state of knowledge. Knowledge and study of aging now seem to be established as complementary to early development as one of the fundamental scientific orientations.

During the past year the Section on Aging was engaged in a major activity in organizing and editing the Handbook on Aging and the Individual: Psychological and Biological Aspects. Chapters for the Handbook were prepared by staff members on the subject matter of their research. The research program, while it has several facets, has two major foci. These are: (1) the gathering of systematic information about the behavioral changes of aging, and (2) the psychobiology of aging. Of continuing concern has been the analysis of age changes in learning and in speed of psychological processes, in which areas several advances were made. Cellular components and extracellular relations in the nervous system continued to be studied, with reason to hope for eventual success in identifying some of the biological accompaniments of the behavioral changes of aging.

The advances in the state of our knowledge about aging has been made manifest by the completion of the Handbook of Aging and the Individual: Psychological and Biological Aspects. The purpose of the Handbook was to pull together material which was widely scattered throughout many scientific and professional publications. The organization of this material in many ways seemed a very necessary early step in systematic research effort. In the absence of a published systematic and comprehensive survey of the literature, the preparation of such a summary was regarded as one of the essential steps in developing the field for undergraduate and graduate education and research.

The data obtained in the extended study of healthy elderly men have finally been analyzed and draft manuscripts have been prepared reporting the results. Data was gathered on 27 men over the age of sixty-five years all of whom were community residents and were judged to be physiologically normal, "healthy." Also studied was a sample of 20 men who had asymptomatic or sub-clinical diseases (mostly vascular). Comparison of these two samples, and also with data from previous studies of young men, gives considerable

Section on Aging (Cont'd)

insight into what psychological changes may be regarded as the normal expectancy of advancing age and those changes associated with disease states frequency in older persons. It is expected that the manuscripts will be combined with those from investigators in other laboratories in the form of a monograph. The monograph will also report the intercorrelation of the experimental psychological, physiological, psychiatric and social psychological data.

In general the results showed that the population studied compared more favorably with test results of young subjects than do the aged men of previous studies less well selected for health status. Two points may be made: (1) healthy men over 65 do better on psychological tests than men unselected for health and (2) age differences in patterns of abilities were found even in a population devoid of apparent disease. These findings are regarded as significant since they clearly point to the fact that age differences in psychological measurements may not be solely attributed to illnesses which frequently occur in aged individuals.

Dr. Alfred D. Weiss reports the results of his measurements of hearing loss, click perception, diotic and dichotic digit span and response to delayed speech feedback. Air conduction hearing loss which was found for most subjects was within "normal" age standards. The click discrimination measurements indicate that healthy older men do not differ from healthy young men in two click discrimination and that the less healthy old tend to have larger discrimination times, i.e., a longer length of interval was required for discrimination between one or two clicks. While all auditory intensity measurements were correlated, none correlated with the two click discrimination threshold. Subjects were also presented with trains of clicks varying in number from one to ten at several rates of speed. The subjects were instructed to report as accurately as possible how many clicks were in the train. The older subject differed from young controls in their ability to enumerate the number of clicks. This measure of "perception" did not correlate with intensity thresholds. In the digit span measurements, distinct age declines were found. The older subjects were relatively poorer in the dichotic situation where they receive different digit series in the two ears. This suggests that the old may have more difficulty than the young in simultaneously monitoring two channels compared with monitoring a single channel. In the delayed speech feedback measurements very little difference was found between groups.

Dr. James E. Birren, in collaboration with Drs. Botwinick and Weiss and Mr. Donald Morrison, analyzed the intercorrelations of the 23 cognitive and psychomotor variables and 9 audition variables. The

Section on Aging (Cont'd)

32 variables were all intercorrelated and analyzed using Hotelling's Principal Component Method. About 58 percent of the common variance was accounted for on the basis of the first five components. Five independent component scores were then derived for each subject. While all five scores showed mean differences in favor of the "healthy" group, only component I was statistically significant. Component I was interpreted to be a measure of previously organized information. Interpretation of the finding was that late life illnesses result in a loss of stored information, primarily verbal; the healthy aged had higher mean information scores than would be expected in a young adult population. However, on perceptual and manipulative types of tasks, the older subjects were slower than the young. In the present study the health difference was smaller than the age difference. This leads to an unanswered question of why "aging" is more important in speed of psychological functions and "health" more important in measures of stored verbal information. Because of the importance of the issues, replication of the findings should be undertaken.

Analysis has been completed of the standardization data of the Wechsler Adult Intelligence Scale which was turned over to the Section by the Psychological Corporation. The results are now awaiting write-up by Dr. James E. Birren and Mr. Donald Morrison.

Dr. Ruth M. Riegel, Visiting Research Associate of the Section, completed a comparison of factorial studies of the Wechsler-Bellevue, the Wechsler Adult Intelligence Scale of the German translation of the test HAWIE. Her results indicated that there seem to be no essential differences in factorial structure of the different versions of the tests or between results obtained on German and American populations.

Dr. Edward Jerome has been studying higher cognitive processes in aging subjects using the Logical Analysis Device of the Psychological Corporation and some additional classical problem-games. To date about 15 young and 10 elderly subjects have been studied in a sequence of individual appointments which for each subject extends over five or more days. The older subjects have expressed a preference for the automatically controlled device despite the fact that they experience difficulty in its solution. The records are being analyzed to identify the source of their difficulties in problem solution which in some cases reflects a failure to secure pertinent information to solve a problem or a disorderliness in the search for information.

In related studies of learning and transfer, using the rat, a group of 40 additional animals were trained during the current year on two problems of different difficulties. The major findings

Section on Aging (Cont'd)

may be summarized as follows: (1) senescent rats learned as quickly and efficiently as "mid-life" rats on a set of problems representing a wide range of difficulties, (2) senescent rats showed as much positive transfer of training as did younger rats, and (3) no age differences were found in the degree of behavioral steriotypy, or rigidity of performance.

Dr. Botwinick found that when elderly and young adult subjects were compared with respect to their achievement and learning performances on card sorting tasks (varied in: extent of perceptual matching or searching, number of stimulus aspects needed to be kept in mind and manipulated simultaneously, and relearning requirements) it was found that the older subjects did relatively poorer with tasks that involved most mental manipulation and perceptual searching. Poor performance was also seen when age differences in motor or movement performance was examined. Relearning rate and practice effects were similar for the elderly and younger subjects.

It was also found that elderly subjects, as compared with young, required more time to prepare or to organize for response. When time intervals were presented regularly but varied between 0.5 and 4 seconds, a disproportionate slowing with age occurred with shortest interval. Much of this slowing was decreased with practice suggesting that at least part of the change with age is related to a difficulty in adjusting or learning to prepare for response during brief time intervals. Increasing the number of stimulus response alternatives had little, if any, differential age effect.

Another study involved general level of activation or reactivity in relation to age. There is reason to think that one aspect of general responsiveness is measured by the GSR. Older adults were found to condition less readily and extinguish more readily than younger adults. This lowered frequency of GSR output was taken as an index of reduced reactivity with age.

Dr. Birren in collaboration with Dr. Klaus F. Riegel designed a study to examine the relations of psychomotor slowing and possible age changes in verbal association strengths and other language functions. In this study subjects are presented with a variety of stimuli on a standard apparatus, the Pschomet, which permits measurements of individual response times while varying "key-light" relationships. Old and young subjects are being systematically observed in a series of tasks involving the measurement of simple movement times, simple and choice reaction time, and a variety of symbolic (numbers, letters, colors) and syllable

Section on Aging (Cont'd)

and word associations. The general objective of the study is to determine the extent to which certain of the age changes in behavior are the result of habit and overlearned language usage or in endogenous changes in the central nervous system which might be reflected in such aspects of performance as speed of response and perception, but which may have some more pervasive implications for verbal reasoning.

Dr. Eugene Streicher has reported results of extracellular space determinations for brain. To obtain a measure of the extracellular space of rat brain, the distribution of thiocyanate between blood and brain was ascertained. (Thiocyanate is considered to be impermeable to most cells.) The "thiocyanate space" was found to be a function of dosage, and extrapolation of the curve relating extracellular volume to plasma level suggests a space of approximately 5-10 per cent. This figure is in general agreement with the estimates of electron microscopists, and indicates that, in contrast to liver or muscle, a large fraction of brain sodium and chloride is localized intracellularly. This conclusion was supported by measurements of brain extracellular space in rats in which cerebral edema had been experimentally induced. In this instance no change was observed in the distribution of thiocyanate, although the sodium content of the brain was elevated 50 per cent and that of the spinal cord was doubled. A few experiments were conducted with the congenitally jaundiced mutant strain of Wistar rat. In animals exhibiting neurological symptoms such as difficulty in walking, the extracellular space of the spinal cord was decreased. The brain thiocyanate space of $2\frac{1}{2}$ year old rats was not significantly different from that of young animals indicating that possible brain changes in aging such as loss of cells, dehydration, gliosis, etc. if they do occur in rats, are not reflected in alterations of the extracellular space. However, in preliminary experiments, it was found that thiocyanate was eliminated from the brains of older animals more slowly than from the brains of younger rats.

During the summer of 1959 Dr. William Bondareff completed his analyses of cytological preparations made the previous year from old and young, fatigued and control animals. The experiment had been designed to investigate whether intracellular deposition of lipofuscin pigment could be initiated in animals by a course of acute muscular fatigue and whether the amount of intracellular pigment normally present in the neurones of old animals could similarly be increased. In both cases it can be definitely stated that if such short-term muscular fatigue, as results when animals are forced to swim until exhausted, does cause an increase in intracellular pigment, the increase is not readily detected by cytological methods. It is possible also that pigment produced

by this means was not chemically equivalent to that normally present and hence was not demonstrated by the cytological technique employed, but it seems justifiable, however, to conclude that there is no increase in intracellular lipofuscin.

Cytologic examination of the distribution of Nissl material does not indicate a great difference between the 3 month and 20 month animal. The Nissl pattern seen in 20 month animals is more closely related to that found in 3 than in 24 month old animals. The cytological picture of 20 month old rats indicates that the metabolic processes of nucleic acid synthesis occur to a degree intermediate between that found in 3 and 24 month animals though more closely comparable to that of 3 month animals.

Section on Animal Behavior

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Rosvold, H. E. The functions of the frontal lobes. N.Y.U.-Bellevue Medical Center, April 1959.

Rosvold, H. E., and Mishkin, M. Non-sensory effects of frontal lesions on discrimination learning and performance. UNESCO Symposium on Brain Mechanisms and Learning. Montevideo - Summer 1959.

HONORS AND AWARDS:

Dr. A. Mirsky was appointed an alternate on the Review Panel of Research Fellowships Section, Division of Research Grants, NIH.

Dr. M. Mishkin was appointed to the Review Panel of Research Fellowships Section, Division of Research Grants, NIH.

Dr. H. Rosvold was elected President, Assembly of Scientists, NIMH-NINDB.

Mr. Howard Wolfe received a monetary award for significant contributions in the development of apparatus.

Section on Animal Behavior (Cont'd)

OTHER ACTIVITIES:

Dr. M. Mishkin spent 3 months in Poland at the Nencki Institute in the Laboratory of Professor Konorsky. While there, he gave several lectures acquainting Polish investigators with American methods and findings with respect to brain-behavior relationships. He participated in several of their ongoing experiments and was able to bring back to NIH a report on their methods, and particularly, on their points of view with respect to the functions of the frontal lobe.

Dr. Stefan Brutkowski, from the Nencki Institute, is now a Visiting Scientist at NIMH working on problems of brain-behavior relationships in order to familiarize himself more intimately with the techniques used by American investigators.

Dr. H. Rosvold attended a UNESCO Symposium on Brain Mechanisms and Learning in Montevideo, S. A., during August. He presented a paper on frontal lobe function. Scientists from several European and South American countries as well as the United States participated. The presentations at the Symposium were very useful in pointing up the present state of our knowledge with respect to how the brain works in learning.

Section on Perception and Learning:

PUBLICATIONS:

Carlson, V. R. LSD - A Pot of Gold? Contemp. Psychol., 1959, 4: 174-175.

Carlson, V. R. Aftereffect of a Moving Pattern. J. Exp. Psychol., 1959, 58: 31-39.

Carlson, V. R. Overestimation in Size Constancy Judgments. Am. J. Psychol., 1960. (In press)

Calhoun, J. B. Population Dynamics of Vertebrates, Release No. 10, Revised Sampling Procedure for the North American Census of Small Mammals (NACSM), Administrative Publication, March 1959, 12 pp.

Submitted for Publication:

Carlson, V. R. Effects of Sleep Deprivation and Chlorpromazine on Size Constancy Judgments. J. Abnorm. Soc. Psychol.

PRESENTATIONS:

Carlson, V. R. Overestimation in Size Constancy Judgments. Presented at the annual meeting of the American Psychological Association, September 1959.

Section on Aging

PUBLICATIONS:

Birren, J. E. How skills change as men mature. Contemp. Psychol., 1959, 7: 216-218.

Birren, J. E. Sensation, perception and modification of behavior in relation to the process of aging, pp. 143-165. Chapter in: The process of aging in the nervous system, Birren, J. E., Imus, H. A., and Windle, W. F., eds. Springfield, Chas. C. Thomas, 1959, 220 pp.

Birren, J. E. Aging and the nervous system, pp. 63-73. In: VA prospectus: Research in aging. Washington, D. C., Veterans Administration, 1959, 124 pp.

Birren, J. E. Psychological aspects of aging. Annu. Rev. Psychol., 1960, 11. (Accepted for publication)

Birren, J. E., ed. Handbook of aging and the individual: Psychological and biological aspects. Chicago, Univ. of Chicago Press, 1959, 965 pp.

Birren, J. E. Principles of research on aging, pp. 3-42. Ibid.

Birren, J. E., Imus, H. A., and Windle, W. F., eds. The process of aging in the nervous system. Springfield, Chas. C. Thomas, 1959, 220 pp.

Bondareff, W. Morphology of the aging nervous system, pp. 136-172. Chapter in: Handbook of aging and the individual: Psychological and biological aspects, Birren, J. E., ed. Chicago, Univ. of Chicago Press, 1959, 965 pp.

Botwinick, J. Drives, expectancies, and emotion, pp. 739-768. Ibid.

Botwinick, J., Brinley, J. F., and Robbin, J. S. Modulation of speed of response with age. J. Genet. Psychol., 1959, 95: 137-144.

Botwinick, J., Brinley, J. F., and Robbin, J. S. Further results concerning the effect of motivation by electrical shocks on reaction-time in relation to age. Am. J. Psychol., 1959, 72: 140.

Botwinick, J., Brinley, J. F., and Robbin, J. S. Maintaining set in relation to motivation and age. Am. J. Psychol. (In press)

Botwinick, J., and Kornetsky, C. Age differences in the acquisition and extinction of the GSR. J. Geront. (Accepted for publication)

Section on Aging (Cont'd)

PUBLICATIONS (Cont'd):

Botwinick, J., Robbin, J. S., and Brinley, J. F. Reorganization of perceptions with age. J. Geront., 1959, 14: 85-88.

Botwinick, J., Robbin, J. S., and Brinley, J. F. Age differences in card sorting performance in relation to task difficulty, task set, and practice. J. Exp. Psychol. (In press)

Brinley, J. F., and Botwinick, J. Preparation time and choice in relation to age differences in response speed. J. Geront., 1959, 14: 226-227.

Jerome, E. A. Age and learning-experimental studies, pp. 655-699. Chapter in: Handbook of aging and the individual: Psychological and biological aspects, Birren, J. E., ed. Chicago, Univ. of Chicago Press, 1959, 965 pp.

Kay, H. Theories of learning and aging, pp. 614-651. Ibid.

Landahl, H. D., Birren, J. E. Effects of age on the discrimination of lifted weights. J. Geront., 1959, 14: 48-55.

Riegel, K. Personality theory and aging, pp. 799-851. Chapter in: Handbook of aging and the individual: Psychological and biological aspects, Birren, J. E., ed. Chicago, Univ. of Chicago Press, 1959, 965 pp.

Streicher, E. Measurement of the extracellular space of brain. An invited paper to be published in a commemorative volume in honor of Dr. Harold E. Himwich on the occasion of his 65th birthday. State of Illinois, Department of Mental Health, 1959. (In press)

Streicher, E. Age and calcium deposition in rat brain. Gerontologia, 1959, 3: 97-103.

Weinbach, E. C., and Garbus, J. Oxidative phosphorylation in mitochondria from aged rats. J. Biol. Chem., 1959, 234: 412-417.

Weiss, A. D. Sensory functions, pp. 503-541. Chapter in: Handbook of aging and the individual: Psychological and biological aspects, Birren, J. E., ed. Chicago, Univ. of Chicago Press, 1959, 965 pp.

Submitted for publication:

Weinbach, E. C., and Garbus, J. Coenzyme A content and fatty acid oxidation in liver and kidney mitochondria from aged rats. Gerontologia.

Section on Aging (Cont'd)

PRESENTATIONS:

Birren, J. E. Continuing growth in the middle years. Address to the Montgomery County Mental Health Association, Jan. 19, 1959.

Birren, J. E. Research on psychological characteristics of the healthy aged. Address to the University of Chicago, Jan. 26, 1959.

Birren, J. E. Report on some studies of aging in elderly men above the age of 65. Address given to the Division of Gerontology, Baltimore City Hospitals, Mar. 17, 1959.

Birren, J. E. A theory of mental development through the life span. APA Symposium, Cincinnati, Ohio, Sept. 4, 1959.

Birren, J. E. Psychophysiological aspects of aging. Address given to the Duke University Conference on Gerontology, Durham, N. C., Nov. 19-21, 1959.

Birren, J. E. Behavioral theories of aging. Address given to the AAAS, Symposium on Aging, Chicago, Ill., Dec. 29-30, 1959.

Birren, J. E., Botwinick, J., Weiss, A. D., and Morrison, D. A factorial analysis of perceptual and mental tests given to healthy elderly men. APA, Cincinnati, Ohio, Sept. 4, 1959.

Botwinick, J., Robbin, J. S., and Brinley, J. F. Card sorting task of perceptual matching, mental manipulation and relearning in relation to age. APA, Cincinnati, Ohio, Sept. 4, 1959.

Riegel, K. Verbal achievement of aged persons. APA, Cincinnati, Ohio, Sept. 4, 1959.

Riegel, R. Factor analyses of the Hamburg Wechsler Intelligence Test for four-age groups. APA, Cincinnati, Ohio, Sept. 4, 1959.

Streicher, E. The thiocyanate space of rat brain. Address to Society for Experimental Biology and Medicine, George Washington Medical School, Washington, D. C., Dec. 4, 1958.

HONORS AND AWARDS:

Birren, J. E. Member, Editorial Board of Journal Genetic Psychology.

Birren, J. E. Council Member, Section on Gerontology and Geriatrics of the Pan American Medical Association.

OTHER ACTIVITIES:

Dr. Birren is Advisor to the Federal Aviation Agency on Problem of Aging in Commercial Airline Pilots.

Basic Research Program
Section on Technical Development
National Institute of Medical Health
Bethesda, Maryland

Annual Report of the Section on
Technical Development, NIMH
Calendar Year 1959

During the calendar year 1959, the Section on Technical Development has continued its role as a supporting organization. About two hundred and fifty projects of various natures have been completed, serving the needs of virtually every Section in each Laboratory of the Research Program. Projects of representative types will be mentioned further on in this report.

The Section has continued to be a source of material and components for the investigators or their representatives. Procurement is carried out with the needs of the entire Basic Research in mind. Obsolete equipment and components have been shunted to Surplus Property in order to better utilize the available space for an up-to-date stock. The blanket purchase order arrangement with Capitol Radio Wholesalers has proven itself so well, due to their complete inventory and fine cooperation, that it is now possible to maintain adequate stock in the Section on Technical Development at the expense of one-half module of space rather than one module. This provides one additional work area and makes practical the recruitment of another technician.

Mr. Paul Byrne, a General Laboratory Mechanic, was added to the Section staff during 1959. This has resulted in a very significant decrease in the waiting time of the researchers who have a purely mechanical problem. This addition was primarily responsible for my being able to detach one man for thirty days for duty at the Marine Biological Laboratory at Woods Hole, Massachusetts.

Additional power supplies, waveform generators and other universally used instruments have been made available for loan. They can be obtained for short term experiments or as interim equipment during purchasing delays.

Basic Research Program
Section on Technical Development
National Institute of Mental Health
Bethesda, Maryland

The Section's fund of technical information and new product listings is being improved continually. As new equipment and components are developed, literature is requested and filed. A technical library is slowly and carefully being built. Some sixty volumes of text on physics, electronics, semiconductors, optics and biological techniques are now on hand.

The Section's time is divided among several functions. These are counsel, construction, development, maintenance and repair. Each of these categories are a part of both internal operation and services to the designated Laboratories. Time permitting, ideas originating within the Section are implemented, where they will be of value in the future, although not yet the object of a specific request. The majority of time is spent in the construction of new instruments and devices to specifications presented by investigators. Equipment previously used is adapted or modified for another purpose. Repairs are made on both commercial equipment and the specialized units that have been developed at the NINDB or NIMH.

Working space and direct assistance are still provided to the scientist who wishes to work on a problem himself. This continues to be a much used and much appreciated function of the Section. It also seems to fit in well with projects underway by members of the Section.

The goals of the Section on Technical Development are unchanged. Foremost is the development of a better tool for the scientist to use, in an effort to create the means for the realization of an idea. As thinking extends a tool to its limits, the justification and need arises for another and better tool. Secondly is the concept of direct assistance whenever possible. Assistance meaning another pair of hands in the scientist's own laboratory, the loan of equipment and components and the exchange of ideas.

In regard to projects completed, a resumé of several representative types will be given.

Basic Research Program
Section on Technical Development
National Institute of Mental Health
Bethesda, Maryland

An auxiliary cathode ray tube display system was designed and built. This "slave scope" works with the Tektronix Type 502, a dual channel oscilloscope. Waveforms may be viewed on either channel of the slave simultaneously with the same waveform on the corresponding beam of the master. Adjustments are provided to equalize such variables as intensity, focus, sensitivity etc. It is used in conjunction with a camera, enabling permanent records to be made. Another slave system, using the Tektronix Type 535 Oscilloscope was built. It is similar to previous models using the Type 535, the variation being one of control circuitry.

It seemed advisable to develop a power supply capable of powering a Type 122 pre-amplifier, which normally uses batteries as a power source. Due to the expense of batteries and their inopportune failures, a supply was designed and built using plug-in stages. Later it was built without the plug-in units, due to an increase in cost of these units. At present a third model is on the design boards which will make use of the regulating capabilities of zener diodes. This model should be useful as a battery replacement for the more demanding D.C. amplifiers.

The design and construction of a working model of an Electrode Holder and Advance Mechanism is now complete. With this unit, dual concentric micropipettes can be accurately positioned and the inner controlled with respect to the outer. Not only is this a critical mechanical assembly, but provisions had to be made for electrical connections and for mounting to the amplifier in such a way that removal can be rapid. Negotiations are completed for the production of a small number of these mechanisms by a private concern.

A device for the control and programming of light stimuli has been developed for experimentation with rats. By means of programming the light patterns, apparent movement can be simulated. This apparent movement can be regulated with respect to time. The effect of this moving stimuli upon the animals is then observed and recorded.

Basic Research Program
Section on Technical Development
National Institute of Mental Health
Bethesda, Maryland

Several high input impedance probes have been constructed with miniaturization, shielding and ease of operation as considerations. The input electron tube is mounted in especially machined aluminum shields, turned down to a few mils in thickness to reduce size and weight. Work is now progressing towards the design of a probe unit to be compatible with the Electrode Holder and Advance Mechanism mentioned previously.

An intercom has been designed for use between an observer and two subjects, all located in separate rooms. Signals as well as verbal communication is possible with this system to be used in dream studies in conjunction with an EEG recorder modified for this purpose. Design and construction of amplifiers and signal oscillators is complete. Further EEG modifications are pending.

Additional enumeration probably serves no purpose since I cannot present a complete list in a report of reasonable length. The projects are widely varied, including repair and modification as well as other new equipment. The coming year will show further progress along the lines of more and better service to the Research Program. This progress will be due to the increasing proficiency of the present staff and, hopefully, to the addition of another capable electronics person.

The Spinal Cord Section, under the leadership of Earl Frank, is proceeding with analysis of fundamental work on generation of impulses in nerve cells. The work is immediately aimed at, determining with certainty, what parts of the neuron produce the A and B spikes and analysis of the role of the dendritic processes. Clamping techniques have been applied and the results are consistent with the previous hypothesis that the A spike originates in the axon and that the B spike originates from only a part of the soma. Work is going forward to plot the field around a single cell activated by antidromic stimulation. This project is dependent on application of some method of improving the signal to noise ratio.

Practical methods for information retrieving are under development in joint projects of this laboratory and the Laboratory of Clinical Sciences. A modification of a method devised by Cox will be used by Dr. Frank in the first phase of this project. This is an important and pertinent area. Means must be found to raise signal to noise ratio for microelectrode work as well as other purposes.

Work is moving in the direction of analysis of integrating mechanisms of the neuron.

It is generally assumed that CNS membrane potentials are sensitive to anoxia, and a recent publication purported to prove that assumption using intracellular recording technics. In a series of excellently designed experiments, Nelson, Frank and Becker have shown that this is not true. The stability of the membrane in hypoxia also has important consequences for certain aspects of spreading cortical depression. Previous work has shown that, with macro-electrodes in the spinal grey, hypoxia produces a quick negative swing. The present work indicates this quick negative swing is essentially an artifact. It is probably due to abnormal sensitivity to hypoxia of the neurons injured by the electrode.

The Section on Special Senses, under the leadership of Dr. Tanaka, has made several developments. Perhaps the most important one is serious application of adequate theoretical treatment to tracer studies. This work was done in collaboration with Drs. Teorell from Uppsala, Fraach from Darmstadt, Germany and Nims from Brookhaven. It has been recognized for some time that tracer data often contained inadequate

information. Recently rigorous theoretical treatment of these problems has been accomplished by Fink and others. Dr. Tasaki and his collaborators have extended these theoretical developments and have made practical application of these concepts on both living and non-living membranes, to get accurate information on ion movements.

Further work has been done on the general propagation of the two stable state process in many kinds of receptor membrane or interface systems. New ways have been found to demonstrate and study the two stable state and hysteretic polarizing responses. The implications of this to mechanoreception have been discussed at an NINDS neurological symposium.

Further work on NMR and EPR Spectroscopy is also going on.

The Section on Limbic Integration and Behavior, under the leadership of Dr. MacLean has proceeded with a broad program in the general area - brain and behavior and the limbic system in particular. This program involves a comprehensive employment of behavioral observations, conditioning and learning studies, electrical examination of the CNS, biochemical lesions and neuroanatomical work.

An intensive work is being done on the functional localization of the genitalia in the brain of the squirrel monkey. Another specific project being conducted by Drs. Geynes and MacLean is aimed at analysis of the interaction between the highly excitable hippocampal system and other parts of the brain on the one hand, and interaction between the hippocampal system and associated neuroendocrine mechanisms. An intensive study is being made on the midline nuclei of the limbic system.

Dr. Ploog is conducting a valuable naturalistic observation study on a small group of squirrel monkeys which is remarkable for the information already obtained but also is an illustration of what can be done with a small group of animals in a crowded laboratory setting. Dr. Ploog's introduction of the squirrel monkey into this laboratory has been, in itself, a valuable contribution. He was also instrumental in introducing the squirrel monkey to the NAS. This group is preparing an anatomical atlas to aid in the laboratory use of the squirrel monkey. The variety of work done by this section is unique and the work is also unique as an example of good basic science with closer than usual relation to clinical research.

The Section on General Neurophysiology has been proceeding with several projects. One of these is an intensive program conducted by Drs. Kandel, Spencer, and Brinley, involving unitary extracellular and intracellular recording from the pyramidal cells of the hippocampus of the cat. This work deals with the fundamental excitation processes of the neuron. A great deal of new information has been obtained. Similarities and differences with data from the spinal motoneuron have been demonstrated. The discovery of prominent depolarizing after-potentials in hippocampal cells is particularly significant in view of the relatively high excitability of the hippocampus. It is interesting to note that the electromicroscope pictures show a smaller than usual extracellular space for the hippocampal neurons. This supplies inferential support for the hypothesis that accumulation of K ion in extracellular space is the cause of the depolarizing after-potentials. There are also important inferences in this argument for mechanisms of spreading cortical depression. This program is proceeding to gain some knowledge of actual integrative mechanisms of which the firing of the cell axon is the end point.

A valuable project was done using tracers to examine K ion release from the cortex by various chemical agents and spreading cortical depression.

Dr. Reokin is proceeding with an interesting method of conducting analysis of sensory discrimination at cortical and thalamic levels.

Dr. Strumwasser is proceeding with unitary extracellular analysis in the frog CNS. This work is aimed at study of the phenomena of attention, habituation, discrimination, extinction, etc. Incidental to this general program, a very useful method of extracellular stimulation was developed and a significant study made of stimulus parameters. This method is particularly useful for locating the cells not reacting in the near vicinity of the electrode. Dr. Strumwasser is proceeding with a project using the dorsal root cells of the frog spinal cord in which cells and electrodes can be directly visualized. This project is expected to aid in clearing up an old controversy about the "gaint" extracellular positive spikes first seriously analyzed by Freygang. One group holds that these positive spikes indicate that a large part of the membrane of many cell types is not electrically excitable. Another group considers that this form of potential is recorded only from injured cells. The electrode is so close to the membrane that injury cannot be excluded so the argument needs more definite evidence. It is to be noted that several

projects in the laboratory include this question in current work. Dr. Skusevich has done valuable work in this area. He is proceeding with advances in instrumenting alternating animals including telestering. The technical facilities of the laboratory are stretched too thin to give this work more than pilot developmental support at this time.

Dr. Freygang has been working this past year with Richard Adrian in Hodgkin's laboratory at Cambridge University. This group is investigating membrane phenomena in muscle fibers.

Summary of Reports for Calendar Year 1959

Section on Physical Chemistry

Sidney A. Bernhard

Although the interaction of the synthetic polynucleotides, polyadenylate and polyuridyate can lead to a complex which has the double helical configuration and paired complementary structure of native DNA, X-ray diffraction studies of the strongly aggregating system polycytidyate-polyinosinate show no DNA type structure. Centrifugal studies of this latter complex indicate strong aggregation, and spectral studies moreover show gross changes in both the rotational and vibrational frequencies associated with the purine and pyrimidine ring substituents of these molecules. The diffraction pattern of this simpler complex appears to be closely related to that obtained for, the as yet undetermined structure of, native DNA.

There exist a large number of cationic dyes which exhibit striking metachromatic color changes when used to stain polyanions such as desoxyribonucleic acid, ribonucleic acid, heparin, and hyaluronic acid in tissue sections. Perhaps the single most important discovery is that the structure of a polyanion determines in part the strength of dye-dye interaction so that the color of bound dye can tell us about the polyanion to which it is bound. We have collected a considerable body of data which supports the generalization that the more rigid and well ordered the polyanion, the weaker the dye-dye interaction. For example, all samples of native, well ordered deoxyribonucleic acid (DNA) examined show the same low value of this interaction, but when they are disordered by heat denaturation, the strength of the interaction increases. This observation has been developed to the point where the color of bound dye can be used to determine the degree of nativeness of DNA specimens. Applying this general principle to structural changes in synthetic nucleic acids it has been possible to confirm certain hypothesized transitions. A quantitative method of analysis in the microgram range for nucleic acids, mucopoly saccharides, and synthetic polyanions has been developed.

In attempting to establish the detailed molecular configuration of the atoms of an enzymatic site it has been found possible thus far to crystallize some small enzymes and enzyme fragments. Some of these have been crystallized with specific substrates and/or heavy atoms. X-ray diffraction patterns of one heavy-atom labeled enzyme have been obtained.

Since the variety of enzyme catalyzed reactions is enormous, it is necessary in any finite study to limit the models to either a particular enzyme or particular class of enzymes.

Summary of Reports for Calendar Year 1959 - Physical Chemistry - continued---

In this investigation we have limited ourself to the largest known class of enzymes with a common catalytic amino acid sequence. The sequence -glycyl-aspartyl-seryl-glycyl- is catalytically inert. Derivatives of this sequence with the hydroxyl of serine esterified (a proposed enzyme-substrate intermediate) show no unusual, reactive chemical properties. Derivatives of this sequence in which the "beta" carboxyl group of aspartic acid is converted to an ester or an amide have striking properties. Thus for example, the beta benzyl ester derivative of this sequence is hydrolyzed (debenzoylated) at a rate one million times faster than normal benzyl esters. The reaction has a "turnover rate" at neutral Ph comparable with enzymatic reactions. Molecular model constructions have resulted in a theoretical proposal of the three dimensional conformation of this molecule in the course of reaction. This "intermediate" conformation has been proposed as the catalytically active form of the enzyme; the configuration being stabilized by the protein superstructure.

One of the most important concepts in molecular biology is that the function of a protein is determined by the sequence in which the component amino acids are linked together. The first step in the theoretical approach to the problem of sequence determination in proteins was to develop a logical system for processing bits of information about individual peptides to determine the unique sequence in the protein. Such a system has been developed in collaboration with Dr. W. L. Duda at the IBM Company. We have provisionally named this system the Logical Unique-Sequence Tracer and have used it to reconstruct long sequences (100 amino acids) from what seemed to be a hopeless confusion of data. However, the system cannot be used to its maximum efficiency by an individual because it involves a very large number of logical decisions so that it is being programmed for a high speed digital computer. With this program in operation, sequencing can be done with a minimum of experimental data. It is planned to carry out gedanken fission experiments to find out on a statistical basis for real proteins how much information value is contained in various-sized peptides, the optimum size of peptides, value of determining only partial sequences on peptides, etc. A preliminary result of great interest is that a method of "indifferent" fission in which a relatively large number of peptide bonds are broken with about equal velocities, e.g., by acid hydrolysis, is suggested as a method which might provide the optimum distribution of breaks in the protein to achieve maximum information. We hope to test this suggestion experimentally in conjunction with scientists in England who are working on the sequence of myoglobin.

LABORATORY OF CELLULAR PHARMACOLOGY
Giulio L. Cantoni, Chief

When the Laboratory of Cellular Pharmacology was originated in 1954 a broad program of research was devised centering around three main lines of investigation: 1) Studies on biological methylation, 2) Studies on amino acid metabolism, and 3) Studies on comparative biochemistry. Although subdivision of the various research activities between these different areas has been somewhat artificial because of large overlaps, the device has nevertheless been useful to classify our activities.

While these areas continue to hold the interest of the laboratory, in the latter part of 1958 and more clearly 1959 some reorientation of the Laboratory's efforts has taken place, and the major areas of investigation can now be grouped more profitably around four topics, namely, a) mechanisms and pathways of protein biosynthesis, b) biological methylation, c) biological oxygenation and d) alkaloid biosynthesis. These new areas of interest stem more or less directly from the three original ones: for instance, alkaloid biosynthesis is conceptually related to our lasting interest in comparative biochemistry and obviously studies on protein biosynthesis represent an extension of our earlier efforts in the field of amino acid metabolism.

From an administrative standpoint, the most notable advance has been the establishment of a new Section on Alkaloid Biosynthesis and Plant Metabolism and the inauguration of a new research program in this area. The research Greenhouse facility has been in operation under Dr. S. H. Mudd since early Spring and is now fully functional and adequately, if not yet optimally staffed. More significant is the fact that the research program which had been originally formulated for this project and had formed the basis for its justification and realization is already beginning to bear fruits, precisely along the lines we had anticipated.

Our findings in this area illustrate once again the value of studying fundamental biochemical mechanisms in whatever biological material is most convenient with the assurance that the facts in a given form may well apply to widely divergent forms.

2-Summary Statement - Laboratory of Cellular Pharmacology

Specifically, it has been established that in the biosynthesis of the alkaloids N-methyltyramine, hordenine and gramine by cell free extracts of barley or millet, the methyl group of these compounds is donated by S-adenosylmethionine. Moreover, it was shown that barley can indeed synthesize S-adenosylmethionine which is identical to that made by vertebrates even to the extent of having the same stereochemical configuration about the asymmetric sulfur and α = carbon atoms. Together, these facts very strongly suggest that the predominant pathway of plant transmethylation lies through S-adenosylmethionine just as it does in vertebrates and microorganisms.

A matter which requires further exploration is suggested by the structural resemblance of two of the particular alkaloids studied to the adrenal hormones and of the third to serotonin: If the role, as yet unknown, of these compounds in plant metabolism can be elucidated, perhaps we will get a hint about the role of these neurohormones or related hallucinogenic materials.

Another area of interest in regard to this system points up the particular advantages of plants as biological forms which are complex, contain many specialized types of tissues and elaborate anatomical and hormonal systems of intraindividual communication, and yet which are much simpler than the vertebrate and vastly more responsive to environmental manipulation and experimental control. Thus, the formation of the alkaloids now being studied is known to be under not only genetic control but under other controls as well so that the formation occurs in a dramatic outburst at a specified stage of ontogenesis and in restricted types of tissues. It seems not unlikely that a study of the interplay of the control mechanisms which are at work here will give some insight into the important question of how enzyme formation and activity is governed in higher organisms. The genetic, environmental, tissue specific and hormonal factors cooperating in this system are undoubtedly complex but it is hoped that the great advantage offered by the relative malleability of the plant to experimental control will aid in elucidating these questions.

With the realization of our plans in the alkaloid biosynthesis area it became desirable to divide the laboratory at least administratively in three sections under the leadership of Dr. Kaufman, Mudd and myself respectively.

3-Summary Statement - Laboratory of Cellular Pharmacology

Dr. Kaufman's section continues to center its interest in the area of biological oxygenation. The two different enzymatic hydroxylation reactions which are being studied by Drs. Kaufman and Levin are yielding results which are complementary to each other in many ways. In both the phenylalanine and the DOPamine hydroxylating systems, new roles have been found for well-known vitamins, folic acid and ascorbic acid respectively. Specifically, it has been established that these cofactors play the role of electron donors in the reactions in which they respectively participate. In both systems, a substrate dependent (i.e., phenylalanine or DOPamine) oxidation of the cofactors takes place resulting in the oxidation of tetrahydrofolic and to dihydrofolic acid in the phenylalanine system and of ascorbic acid to dehydro-ascorbic acid in the DOPamine system. While the ultimate electron acceptor in both reactions is oxygen, it is possible that an enzyme bound metal or even the substrate molecule may serve as the immediate electron acceptor.

These studies in addition to their intrinsic scientific value contributes significantly to the area of basic research in the field of neurology and mental health for they are of obvious and direct significance to the problems of synthesis and function of the catecholamines and to the pathogenesis of phenylketonuria oligophrenica. Indeed, the basic facts discovered by Dr. Kaufman in these studies are being utilized by Dr. Kaufman and Dr. Weiss, of the Laboratory of Clinical Science, in a clinical study of phenylketonuric children in the hope of discovering and devising some way to alleviate morbidity in this area. Although phenylketonuria contributes only a small fraction of the patients in the area of mental retardation it would be highly gratifying to be able to contribute in some measure to the solution of this medical problem.

The work of the section on proteins centered primarily around two problems of fundamental interest.

The protein synthesis project, which is occupying the main interest of the laboratory, is a multi-pronged attack on what may be considered one of the central problems of biochemistry. At the present time, it appears most profitable to concentrate our efforts on a study of the chemistry, molecular configuration and biological properties of S-RNA, a polynucleotide of relatively small molecular weight which appears to function as an acceptor

4-Summary Statement - Laboratory of Cellular Pharmacology

and donor of activated amino acids for protein synthesis. S-RNA has been studied with respect to its physico-chemical properties, as revealed by electrophoresis ultracentrifugation and viscosity measurements, its chemical nature, as demonstrated by base composition and its enzymatic and biochemical characteristics. A significant feature of the biological activity of S-RNA is its specificity for different amino acids but the basis for this specificity is yet unknown. Work from this laboratory has established that molecular weight plays no role as a specificity determinant and furthermore that the different S-RNAs which are specific for the different amino acids all have similar or identical molecular weight. This suggests that the basis of the biological specificity must reside in the nucleotide composition or sequence and by a study of this problem it is hoped to obtain some clue as to principles of biological coding mechanisms. In the pursuit of these objectives the Laboratory has enjoyed the collaboration of Dr. Maxine Singer of the Laboratory of Biochemistry in NIAMD.

The second problem which has progressed favorably in the last year has been the study of the properties of thetin homocysteine methyltransferase. It has been known for some time now as the result of the work of this laboratory that this protein which represents approximately 1 percent of the total liver protein is capable of undergoing an interesting and rather unique reversible polymerization reaction. The biological significance of this reaction is not yet fully understood; the possibility is under investigation that it may be related to the complex changes occurring during cell mitosis or even more generally that this protein may fulfill some cyto architectural role in the cell.

During 1959 the Laboratory has enjoyed and benefited from the association of three visiting Scientists:

Dr. Olga Greengard, formerly of Middlesex Medical School, London, England -

Dr. Othmar Gabriel, formerly of Vienna University and now at Columbia University -

Dr. Claude Blanc, formerly of Marseille University and now in the Laboratory of Cellular Pharmacology.

Annual Report, January 1 through December 31, 1959
NIMH -- Laboratory of Clinical Science
Seymour S. Kety, Chief

The Laboratory of Clinical Science was established to straddle what might have become a gap between the basic disciplines, especially the biological fields of biochemistry, physiology and pharmacology, and the problems of psychiatric disease. Its division into basic and clinical sections represented the stake which each of these programs has in the functions of the Laboratory, but, although the scientific work has represented a broad spectrum of activity from studies on patients with psychiatric disorder, on normal volunteers or on non-clinical and rather basic problems, there is no precise relationship of the scientific activities to the administrative division. In fact, the extent to which the clinical-basic division is not clear represents the success which the Laboratory has had in breaking down the conceptual barriers which often separate these two approaches. For purposes of this summary, the work of the Laboratory in the past year may be divided into certain problem areas: schizophrenia, ageing, experimental allergic encephalomyelitis, sleep, and specific problems of metabolism related to the nervous system or behavior.

Schizophrenia

The Laboratory has continued its major program of investigation into the possible rôle of biological factors in the etiology and pathogenesis of schizophrenia and their interaction with social and psychological factors. The broad survey which the Section on Psychiatry had previously made of the family histories of male patients diagnosed as schizophrenic in the public hospitals of Maryland and the District of Columbia in the process of selecting patients for participation in the studies of the Laboratory, provided an opportunity for an analysis by Drs. Pollin and his associates of the distribution of schizophrenia and other forms of mental illness in the families of schizophrenics. This revealed a preponderance of schizophrenia in the mothers, as opposed to the fathers, of such patients and was further supported by an extensive analysis of data in the literature. Although this appeared to support the sociologically based theories of the role of maternal influence in the development of schizophrenia, further analyses of alternative explanations revealed that the findings were compatible with a considerably greater marriage and fertility rate found among schizophrenic females in contrast to males.

The Section on Psychiatry is presently engaged in a careful study of the life situations of the selected group of patients under investigation by the Laboratory in comparison with their non-schizophrenic siblings in an effort to elucidate the special and perhaps highly individualized psychosocial factors operating before the development of the mental disorder.

Among the attractive hypotheses which are currently attempting to account for schizophrenia in biochemical terms, perhaps the most interesting is that based upon a postulated disorder in the metabolism of circulating epinephrine with the production of possibly psychotomimetic substances such as adrenochrome. By virtue of the recent excellent work of Dr. Axelrod in elucidating the normal pathways of metabolism of this hormone, the Laboratory was uniquely equipped to test that hypothesis. Szara, Axelrod and Perlin, more than a year ago, had ruled out the presence of abnormal or even detectable concentrations of adrenochrome in the blood of schizophrenic patients, and at the same time, McDonald and his associates had demonstrated that the reported rapid in vitro oxidation of epinephrine by the serum of such patients was the result of a dietary deficiency of ascorbic acid. An extensive study of the metabolism and the physiological and psychological effects of epinephrine infused into a series of normal controls and schizophrenic patients was undertaken collaboratively by a number of investigators in the Laboratory. Dr. Mann has found that the over-all rate of metabolism of this hormone as judged by blood levels achieved and the rate of their decay was identical in the two groups, while Dr. LaBrosse has demonstrated that the pathways of metabolism and the metabolic products of epinephrine were the same in schizophrenics as in normal man. Studies by Dr. Cardon on the cardiovascular effects of infused epinephrine, by Dr. Sokoloff on the blood glucose response, and by Dr. Pollin on the mental effects tended to confirm the slight differences which had previously been reported. Although the latter findings indicate some differences in response which are being further studied, the metabolic studies leave little room for the possibility of the generalized disturbance in epinephrine metabolism in this disorder which had been postulated.

Because of suggested possibilities of a disturbance in histidine metabolism in schizophrenia, Dr. Brown in the Section on Biochemistry undertook a study of the urinary metabolites of the amino acid uniformly labeled with C¹⁴. Although this study resulted in a number of significant basic findings which are discussed later, it revealed no differences between the normal and schizophrenic patterns.

There is no a priori reason to suspect that if a biochemical abnormality exists in some types of schizophrenia, it must be generalized. On the other hand, a number of cogent arguments point to the highly differentiated metabolism of the brain as more likely to harbor important chemical mediators of behavior, both normal and abnormal. The inaccessibility of the brain for investigation during life makes it necessary to devise indirect methods of approach to possible cerebral metabolic disorders in schizophrenic patients. Dr. Kopin has been developing highly original, double-labeling techniques which may be suitable for the study of the metabolic turnover of such substances as serotonin and norepinephrine and other amines in the human brain. Another approach is to produce certain mild alterations in the chemistry of the brain in man on the basis of biochemical theory or of changes shown to occur by direct analysis in animals and carefully to study the effect of these discrete chemical changes on mental function as determined by carefully controlled but intensive psychological and psychiatric evaluations. One such study, initiated in the past three months and participated in by a number of investigators of this and other laboratories employs the dietary or parenteral administration of certain known precursors of possibly psychoactive substances known to occur in the brain in conjunction with certain enzyme inhibitors which may retard their destruction. There has been an opportunity partially to test tryptophan, phenylalanine, histidine, glutamine, glycine and methionine with and without the possible potentiating effect of small doses of iproniazid in this situation. Certain behavioral changes have been observed and reproduced and these findings are being actively pursued.

The discovery and characterization of the significant metabolites of epinephrine and norepinephrine makes possible for the first time reliable measurement of the endogenous production of these important hormones, not only in schizophrenia but in a large variety of psychiatric states and situations. Dr. McDonald and Dr. LaBrosse and their associates have undertaken the development of simple and reliable methods for the quantification of 3-methoxy-4-hydroxymandelic acid and of metanephrine and normetanephrine, respectively, in the urine. A method for the first of these compounds has already been developed and is being applied in studies of schizophrenia and other mental states and the effects of certain psychoactive drugs.

New information on the properties of certain drugs which have been extensively used in schizophrenia has been obtained in the past year. Dr. Axelrod of the Section on Pharmacology has demonstrated that both chlorpromazine and reserpine speed the destruction of epinephrine in vivo, representing one of the rare biochemical effects thus far discovered which these two drugs with similar psychiatric effects have in common. Confirming this in man, Dr. McDonald has shown a sharp increase in the excretion of a major metabolite of the catecholamines following a single dose of reserpine. Dr. Kornetsky further replicated his finding of a differential effect of chlorpromazine on the standing blood pressure of normals and schizophrenic patients and plans to investigate the possible mechanisms of this action in his new position at Boston University.

The absence of specific biological criteria in schizophrenia is matched by the paucity of reliable objective psychometric indices of the disorder. Dr. Feinberg of the Section on Physiology has carried out a series of studies aimed at differentiating the mental impairment associated with schizophrenia from that associated with non-schizophrenic illnesses. He has succeeded in designing a psychological test on which the performance of acute schizophrenic subjects differs significantly from that of patients with organic mental syndrome. The test in question, a modification of Raven's Matrices, shows that the acute schizophrenic patients make many more unreasonable errors than do chronic schizophrenic patients or patients with organic mental syndrome. These results point the way to a more precise and objective characterization of the nature of cognitive impairment in schizophrenia. The Section on Psychiatry is continuing its work on the development and testing of new methodologies which may provide data which are both clinically and psychodynamically meaningful and at the same time, verifiable and quantifiable.

The manifestations of psychiatric illness more than any other group of diseases probably represent the interaction of a multitude of factors from the sociological as well as the biological spheres, and a single and sufficient cause for a process like schizophrenia is probably not to be expected. One of the real values of an intensive interdisciplinary study of a selected small sample of patients is the opportunity thus afforded for relating findings of one discipline to those of many others in the same patient. To take full advantage of this opportunity, the Laboratory with invaluable collaboration by Dr. Greenhouse of the Biometrics Branch, NIMH,

and by the computer facility of the NIH, has undertaken a program of data reduction and comparison which will make for the maximum utilization of the data obtained by the individual investigators and their intercorrelation with other information.

Ageing

Studies by Dr. Sokoloff and the Section on Cerebral Metabolism in over 50 normal elderly men, carefully selected for their relative freedom from the common degenerative diseases of old age and who were functioning competently in their communities were completed and analyzed in the past year as part of a large collaborative study in this Institute with several very cogent results. This series showed no reduction in cerebral circulation or cerebral oxygen consumption in comparison with healthy young men, indicating that the reduction in these functions usually found in less carefully selected patients is not a necessary concomitant of the aging process. In the presence of arteriosclerosis of varying degrees there is a decreased cerebral blood flow, a decrease in cerebral venous oxygen tension indicative of cerebral anoxia, and a somewhat smaller fall in oxygen utilization which appear to be correlated with the degree and duration of the arteriosclerosis and the psychological deficit, suggesting that one of the primary changes in the mental disorders associated in some individuals with aging is cerebral circulatory insufficiency and the resultant partial cerebral anoxia. Patients suffering from what is known as chronic brain syndrome showed a more marked decrease in cerebral oxygen consumption compatible with the thesis that this syndrome represents parenchymal damage in the last stages of progressive cerebral ischemia.

Drs. Butler and Perlin of the Section on Psychiatry have studied these patients from the psychiatric point of view. In addition to contributing the psychiatric component of the correlations mentioned above, their studies on the psychiatric aspects of the aging process have revealed the importance of the personal meaning of psychosocial changes in terms of the individual personality as compared with the nature or incidence of the stresses themselves. The psychological defense mechanisms utilized by the volunteers and patients were studied and described in terms of their adaptive or maladaptive consequences.

Experimental Allergic Encephalomyelitis

This experimental disorder, produced in guinea pigs by the subcutaneous injection of brain tissue with certain adjuvants, offers a useful model for the investigation of multiple sclerosis and other demyelinating or degenerative diseases. During the past year the Section on Biochemistry has continued its studies on the etiology and pathogenesis of this disease. Purification of a water soluble antigen continues to be of major importance in this project. Encouraging results have been obtained with chromatography on modified starch columns as a means of separating traces of inactive protein from the antigenic material.

Of considerable significance to both pathogenesis and treatment of the experimental disease are the immunologic results obtained with this purified antigenic fraction. All immunologic tests on the antigen (skin and corneal hypersensitivity, serum antibody reactions) have been negative. However, carefully controlled skin testing has led to the observation that the disease can be suppressed by intracutaneous injections of aqueous solutions of the active fraction after the initial injection. A study of the significant variables in suppression of the disease in this manner offers exciting possibilities with regard to therapy and prevention of related neurologic diseases in humans.

Sleep

This equally common and mysterious state is an important segment of normal mental function and has associated with it the phenomenon of dreaming with certain interesting parallels to schizophrenic thought processes. Ten years ago, Drs. Sokoloff and Kety and their associates had demonstrated that normal sleep was not associated with cerebral ischemia, anoxia, nor with the reduction in oxygen and energy utilization associated with coma and anesthesia, providing evidence that sleep consisted of a change in the patterns of activity in the brain rather than a change in their over-all intensity.

During the past year the electrophysiological work of Dr. Evarts and the Section on Physiology has been devoted to studies of the effects of sleep on the electrical activity of the brain. These studies have indicated that sleep has different effects on activity in the brain stem reticular formation as compared to the cerebral cortex. These findings support and extend the theories of previous workers (Magoun and others) concerning the role of the reticular formation in the waking state.

During sleep, potentials evoked by clicks in the reticular formation are reduced, whereas cochlear nucleus and primary cortical potentials remain relatively unchanged. Recordings of single unit activity from the visual cortex show a considerable increase in total neuronal discharge during sleep as compared to the waking state. These microelectrode studies indicate that during waking there is a selective reduction of spontaneous neuronal discharge as compared to discharge evoked by primary afferent input (electrical stimulation of lateral geniculate radiations). This selective reduction of spontaneous neuronal discharge might be viewed as leading to an increase in the signal to noise ratio during waking. This notion involves the supposition that the spontaneous discharge is "noise" and the discharge evoked by afferent stimulation is "signal." Such a change in the pattern of neuronal discharge may be of importance in attention mechanisms associated with the waking state. Studies of evoked potentials recorded from scalp electrodes in man are to be carried out in order to determine the degree to which similar alterations of electrical activity may be found to be associated with sleep in man. These studies were made possible by an ingenious new technique for enhancing the signal to noise ratio in such recordings which was developed by Mr. Cox.

Dr. Cardon has continued his interest in the physiological and psychological effects of sleep deprivation. Subjects whose continuous performance is impaired show characteristic changes in heart rate, respiratory rate and depth, fingertip volume and pulse volume, and forearm volume pulse form. These changes occur in the course of the test when the subject is not responding to the visual or auditory cues presented, and disappear when the subject is responding. Thus, there seems to be abundant confirmation, at the physiological level, of the current hypothesis that much of the impairment of psychic functioning which accompanies sleep loss is due to "lapses" or "microsleeps."

Metabolism

Mechanism of action of thyroxine: A unique feature of the cerebral metabolism is its apparent lack of response to high circulating levels of thyroid hormone. An understanding of the basis of this unique behavior may reveal information concerning the metabolism of the brain in health and disease. The mechanism of action of thyroxine has been under investigation for many decades, but thus far a satisfactory explanation of how it increases metabolic rate,

stimulates metamorphosis and growth, or causes the many disturbances in body physiology and biochemistry in thyroid diseases has eluded investigators.

Dr. Sokoloff and the Section on Cerebral Metabolism have continued to make progress in their investigations of the mechanism of action of thyroxine. Their finding last year that L-thyroxine enhances the in vitro incorporation of amino acids into protein has been shown to be a definite stimulation and not a preservative effect. They have uncovered evidence of a latent period of action of thyroxine in vitro during which a still unidentified intermediate is formed which is then responsible for the stimulation. They have demonstrated that the formation of this intermediate is dependent on the presence of an active oxidative phosphorylating system. Their studies with the physiologically less active isomer, D-thyroxine, and the physiologically active analogue, L-triiodothyronine, indicate that the thyroxine effect on amino acid incorporation behaves in a manner to be expected of a physiological effect of thyroxine. They also suggest that D-thyroxine is physiologically inactive, not because the intracellular enzymes involved in the action of L-thyroxine are stereo-specific, but because it does not reach the enzyme sites when administered into the intact animal. Dr. Kaufman of the Laboratory of Cellular Pharmacology has been an active collaborator in many of these studies. The findings of this project represent encouraging progress toward the ultimate solution of the mechanism of action of the thyroid hormone.

Metabolism of epinephrine and norepinephrine: During the past year the Section on Pharmacology was mainly concerned with studies on the metabolism and physiological disposition of H^3 -epinephrine. In collaboration with Dr. Weil-Malherbe the distribution and rate of O-methylation of epinephrine was investigated. The amine was found to be unevenly distributed in various organ tissues and did not pass the blood-brain barrier except to a small extent in the hypothalamus. Within two minutes most of the administered catecholamine was O-methylated, while part of the hormone was bound by tissue constituent and retained in the body for long periods of time.

Dr. Axelrod, in collaboration with Drs. Kopin and Mann, reported a new metabolite of epinephrine and norepinephrine, 3-methoxy-4-hydroxyphenyl glycol. This compound was shown to arise from the deamination of (nor)metanephrine, followed by reduction. Subjects with pheochromocytomas excreted large amounts of the glycol.

Inhibitors for catechol-O-methyl transferase *in vitro* and *in vivo* have been found (pyrogallol and quercetin). Since other investigators have shown that these compounds prolong the action of epinephrine and sensitize the sympathetic nervous system, it would appear that catechol-O-methyl transferase is the enzyme chiefly concerned with terminating the action of the catecholamine hormones.

Using C^{14} and H^3 labeling of various precursors and intermediates in the metabolism of catecholamines, a technique is being developed by Dr. Kopin which enables estimation of the relative importance of alternate pathways of metabolism of one substance to an excreted metabolite, in a single experiment. The rate of metabolism of the precursor substance can also be estimated by study of the rate of change of the H^3/C^{14} ratio in the excreted compounds. The effect of various drugs on the routes of metabolism of the catecholamines and on their rate of metabolism is being studied. Using this technique an estimate of the importance of the pathways of epinephrine metabolism in man has been made. About 2/3 of an injected dose of epinephrine undergoes methylation while the rest is either excreted as such or acted upon by monoamine oxidase. About half of the 3-methoxy-4-hydroxyphenyl glycol and 3-methoxy-4-hydroxymandelic acid formed from injected epinephrine is formed by methylation followed by deamination. In the rat, methylation is of lesser importance, but is still a major pathway of metabolism.

Metabolism of histidine: Incidentally to his studies on the metabolism of this amino acid in schizophrenic patients, Dr. Brown of the Section on Biochemistry made a number of contributions relating to the normal metabolism of histidine which dwarfed the initiating study in their significance. An unstable metabolic intermediate (imidazolone propionic acid), whose existence was postulated but which had not hitherto been isolated, has been stabilized and characterized in collaboration with Dr. Kies, and a new metabolite present in the urine of man and other species has been identified (hydantoin propionic acid). In collaboration with Dr. Axelrod, a new methylating enzyme has been demonstrated and partly characterized as N-methyl transferase, which catalyzes the transfer of CH_3^- from S-adenosylmethionine to the imidazole ring of histamine. The presence of this enzyme in highest concentrations in the brain suggests the possibility of a significant function for histamine or some related amine in central nervous function.

Metabolism of other amino acids: Because of the relationship to certain amines which may play a central role in the mediation of particular types of behavior or emotion, a number of amino acids are of special interest to psychiatry. Studies by Drs. LaBrosse, Kopin and Hotta are under way on certain aspects of the metabolism of tryptophan, phenylalanine, glutamine, methionine and tyrosine in an effort to relate the differential aspects of their metabolism to mental and behavioral state, to dietary intake or to the action of certain psychopharmacologic agents which may operate by an effect on such pathways.

Enzymatic Activities in Blood

Dr. McDonald in collaboration with Dr. Felsenfeld has been concerned with studies on the chemistry of ceruloplasmin. This approach comes as a logical development of previous studies in his Section on the possible role of ceruloplasmin in mental disease. In the current studies of ceruloplasmin it has been shown that copper exists in both the oxidized and reduced state. Furthermore, when ceruloplasmin is actively functioning as an oxidase, there is an increase in the amount of reduced copper present in the molecule. Other aspects of the chemistry of ceruloplasmin are presently under investigation.

A second area of study has been by Dr. Evans of the Section on Medicine concerning serum cholinesterase. In this study the effects of psychotomimetic and psychotropic drugs on two forms of human serum cholinesterase have been investigated. The difference in the responsiveness of the two forms of enzyme to inhibition by the psychotomimetic drug, lysergic acid diethylamide, was found to deviate from the pattern usually seen, suggesting a different mode of reaction. In addition, an apparently new deviant form of cholinesterase was discovered in a screening of mental hospital patients, although there is no reason to believe that its presence is related to mental disease.

ANNUAL REPORT - NARRATIVE SUMMARY

NIMH Addiction Research Center
PHS Hospital, Lexington, Kentucky

For the period 1 January to 31 December 1959

1. Administrative

In addition to the increased demands on the services of the administrative unit consequent to assumption of duties previously performed by the hospital (see 1958 annual report), the work of this unit has been augmented during the current year because of the increased volume of reports, manuscripts and other scientific papers requiring its services, as well as the augmentation of other administrative responsibilities consequent to the addition to the research staff of several professional and technical personnel (see below). Furthermore, there has been a steady increase in the volume of correspondence with non-governmental as well as governmental individuals and institutions, as well as in the number of visits to the Addiction Research Center by scientists from all over the world. Though these demands have taxed the resources of the administrative unit the performance of the personnel responsible for these tasks (administrative assistant, library assistant, secretary

and clerk-stenographer) have been superb, reducing very substantially the time and effort that the professional staff would have otherwise had to expend in dealing with such matters.

The performance and esprit de corps of the medical aides, as well as of the other technical and professional staff have also continued at the high level characteristic of previous years. During the current year there have been two resignations: one by Dr. R. E. Belleville (psychologist) to accept a position with the Air Force, offering work in which he had recently become especially interested, and the other by Mr. Samuel E. Naive (part-time shop technician) to operate a farm which he had recently acquired.

Though mentioned as prospective in the 1958 annual report the following promotions were completed on 30 November 1958: Mr. Woodrow W. Carter, to supervisory medical biology technician GS-7; Mr. Mitchell E. Groce and Mr. Ellis L. Williamson, to medical biology technician GS-5; Mr. Charles G. Eades, to pharmacology technician GS-7; Mrs. Luella R. Wainscott, to library assistant GS-7; Mrs. Thelma K. Hollingsworth, to secretary GS-5.

The following promotions were made effective in 1959 (up to the date of the present report): Mr. Charles A. Haertzen to clinical psychologist GS-9; Mrs. Jewell W. Sloan, to chemist GS-9; Mrs. Ruth M. Nordstrom, to administrative assistant GS-9; Mr. James W. Brooks, to physical science aide GS-7; Mr. Ezra C. Bell, to medical biology^F technician, GS-5; Mr. Orville A. Kelly, to assistant supervisory medical aide GS-6.

Two vacated positions were filled during this calendar year by new appointments, namely: Mr. John N. Schneider, electronic engineer GS-7, replacing Mr. Samuel E. Naive; and Mr. Phillip C. Green, experimental and physiological psychologist GS-11, replacing Dr. R. E. Belleville. Other new appointments were: Dr. Albert B. Wolbach, Sr. Asst. Surgeon (R), who has been assigned to general medical duty on the research wards; Mr. Roy S. Yamahiro, clinical psychologist GS-9; Mr. Herbert D. Smith, clinical psychologist GS-5; Mrs. Barbara W. Smith, clerk-stenographer GS-4; Mr. Irvin Winkler, experimental animal caretaker GS-3; and Mr. John G. Rutledge, experimental animal caretaker GS-2.

In addition, it has been recommended that Dr. Harris E. Hill be promoted to supervisory clinical psychologist (general) GS-14, and Mr. Harold G. Flanary to supervisory physicist (biophysics) GS-13, because of the increase in the scope and level of their responsibilities as well as their excellent performance.

In July, 1959, the director, Dr. Harris Isbell, departed for Europe to spend a sabbatical year at research centers abroad, devoted primarily to study of methods of investigation and treatment of narcotic addiction and alcoholism and current developments in the area of "experimental psychiatry." At present Dr. Isbell is participating in the meetings of the Committee on Drugs Liable to Produce Addiction of the World Health Organization in Geneva, Switzerland. Dr. Abraham Wikler is serving as Acting Director during the absence of Dr. Isbell. During the year, Drs. Isbell, Wikler, Fraser, Essig, and Martin delivered lectures at universities on various subjects and participated to a large extent in the residency training program at the Lexington hospital. Dr. Wikler completed his 2 1/2-year term of duty as member of the Behavioral Sciences Study Section, DRG, NIH, in September 1959; he has continued to serve as editor for the United States and Canada of the new journal, Psychopharmacologia. Dr. Fraser has been appointed as consultant on New and Nonofficial Drugs, American Medical Association. Drs. Wikler, Fraser, Essig and Martin have been invited to participate in the teaching of pharmacology (neuro-pharmacology) at the University of Louisville School of Medicine next year.

The major needs of the Addiction Research Center continue to be those of a new building for animal quarters and laboratories, and the recruitment of an additional biochemist with special qualifications in enzyme chemistry to develop a program of research of the mechanisms of drug actions and addictions at the cellular level. The present status of both of these problems remains the same as that described in the 1958 annual report. In addition, consideration is being given to the possibility of adding a section on socio-environmental aspects of addictions to the Addiction Research Center.

To meet the most pressing of the current needs for additional animal laboratory space, a former bathroom and a shower room in the quarters now occupied by the personnel of the Section on Experimental Neuropsychiatry have been remodeled to serve as an animal conditioning laboratory and a histology laboratory, respectively. In this work the maintenance department of the hospital was most helpful.

11. Studies on Addictive Properties of New Analgesics

These studies are designed primarily for the purpose of providing information on the human addiction liabilities of new drugs (chiefly potent analgesics with morphine-like properties) for use by authorities responsible for recommending

measures for control of manufacture, distribution, and dispensation of such agents at national and international levels. They also assist the medical profession in the evaluation of therapeutic and toxic properties of new drugs for clinical use, and provide opportunities for basic research on the mechanisms of tolerance, addiction, and habituation.

During the current year advances were made in the improvement of methodology for measuring the overall abuse-liability of new drugs. Thus, "subjective" and "objective" rating scales of behavioral change (with particular reference to "euphoria") were developed and tested with a large number of new drugs under double-blind conditions. These quantitative data revealed a high degree of concordance between the subjects' self-ratings ("subjective") and those made by other observers ("objective") in the cases of the more potent analgesics, but considerable discordance when weaker analgesics were tested; hence both types of measurement have to be taken into account in the final evaluation. Another interesting finding was that only 39 per cent of the subjects reported that they would like to continue the use of one of the drugs tested (morphine subcutaneously) daily. Subsequently it was found that this was also true for heroin, subcutaneously (42 per cent for morphine, 39 per cent for heroin). These studies will be extended later to include intravenous injections to which addicts are more accustomed under "natural" conditions.

Also it was found in a double-blind procedure involving testing of eight analgesic drugs that reliable information on their ability to produce tolerance and physical dependence could be obtained with much shorter periods of chronic administration, e.g., 18 to 20 days, than has been assumed heretofore. This appears to be definitely true for the more potent analgesic drugs, but further work is necessary to establish its usefulness in the evaluation of less potent analgesic agents. The method promises to be of considerable value in shortening the time required for evaluation of the addiction liability of new compounds. Currently the double-blind procedure is being applied also in the use of the 24-hour substitution method for testing addiction liability -- i.e., the substitution for morphine, over a period of 24 hours, of a new drug in morphine-tolerant subjects, with measurement of the extent to which the morphine abstinence syndrome is suppressed. As part of this program, work was continued on four compounds about which preliminary results were described in the last annual report, and five new drugs were also investigated. The outcome of these studies may be summarized as follows:

1. d-Methadone. Euphoriant dose, 250-400 mg orally; suppression of abstinence from morphine, 1/14th as potent as morphine; nalorphine precipitation test, positive; abstinence syndrome after direct addiction, mild (toxic effects at high chronic doses -- weight loss, neutropenia, lymphocytosis, positive thymol turbidity test). These results will be reported to the Committee on Drug Addiction and Narcotics of the National Research Council, and submitted for publication.

2. R-1132. This is a complex compound with a piperidine nucleus developed by a Belgian firm for use as a constipating agent. Euphoriant dose, 60 mg orally, comparable in effectiveness to 120 mg of codeine in producing morphine-like behavioral effects; suppression of abstinence from morphine, by the oral route, about one-half as effective as morphine subcutaneously; abstinence syndrome after direct addiction, orally, milder than oral morphine or oral codeine. The work on this compound has been completed and the results will be presented to the Committee on Drug Addiction and Narcotics, NRC, and prepared for publication.

3. NIH-7525 (An N-phenacylmorphinan compound). Euphoriant dose, 2-3 mg (subcutaneously), equivalent to 20-30 mg of morphine, administered by the same route (as little as 0.5 mg

intravenously identified as "like heroin"); suppression of abstinence from morphine, 1 mg equivalent to 10 mg of morphine; abstinence syndrome after direct addiction, moderately severe, but significantly less than after direct addiction to equivalent intoxicating doses of morphine; nalorphine precipitation of abstinence, positive. Full controls under the narcotics laws have been recommended by the Committee on Drug Addiction and Narcotics, NRC.

4. NIH-7519 (A substituted benzmorphane compound).

Euphoriant dose, 3-4 mg subcutaneously (equivalent to 20-30 mg of morphine); suppression of abstinence from morphine, 1 mg equivalent to 8.1 mg of morphine (in this respect action in man differs markedly from that in monkey, in which species this drug is only one-sixth as potent as morphine in suppression of abstinence); abstinence syndrome after direct addiction, moderately severe but significantly less than after equivalent intoxicating doses of morphine; nalorphine precipitation of abstinence, positive. Full controls under the narcotic laws have been recommended by the Committee on Drug Addiction and Narcotics, NRC.

Studies on both this compound and NIH-7525 have been completed and the results are being prepared for publication.

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DO hereby certify that
[Name] is a [Title]
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and is authorized to [Action]
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5. NIH-7296A (A substituted morphinan compound).

Euphoriant dose -- "euphoria" not consistently reported even after administration of as much as 1,000 mg orally, but 3 of 4 subjects reported morphine-like effects when 500 mg were administered orally four times daily, although toxic effects (gastric disturbances, mental confusion, anxiety) supervened after one or two days; suppression of abstinence from morphine, only 1/25th as potent as morphine; abstinence syndrome after direct addiction, none found but dose level achieved during chronic intoxication was equivalent to only 48 mg of morphine per day. Work on this compound has been completed and will be reported to the Committee on Drug Addiction and Narcotics, NRC, and prepared for publication.

6. NIH-7590 (A substituted piperidine carboxylate

congener of Demerol). Euphoriant dose, 15-20 mg (equivalent to 20-30 mg of morphine); suppression of abstinence from morphine, 0.5 mg equivalent to 1 mg of morphine (contrasting with findings in monkeys, in which species NIH-7590 is eighteen times as potent as morphine). No further work is planned on this compound. Full control under the narcotic laws have been recommended by the Committee on Drug Addiction and Narcotics, NRC.

7. NIH-7586, ARC I-G-1. (A substituted chlorobenzyl benzimidazole). Euphoriant dose, 100 mg orally; suppression of abstinence from morphine, partial (2.62 mg equivalent to 1 mg of morphine). Since it is unlikely that this compound will ever be marketed, no further investigations of its addiction liability are planned. The results obtained will be reported to the Committee on Drug Addiction and Narcotics, NRC, and prepared for publication.

8. NIH-7607, ARC I-G-2. (A substituted ethoxybenzyl benzimidazole). Though closely related to NIH-7586 in chemical structure, this compound is far more potent. In mice and rats its analgesic potency is said to be 15- to 17-hundred times that of morphine; it is also 15-hundred times as potent as morphine in suppressing the morphine abstinence syndrome in the monkey. In man, the euphoriant dose appears to be about 0.25 mg orally (80-120 times as potent as morphine), and sixty times as effective orally as morphine is subcutaneously in suppressing abstinence from morphine; in a "short" (18 day) direct addiction study it was possible to achieve a dose level of 4 mg daily without alarming effects; and after abrupt withdrawal of the drug, an abstinence syndrome ensued which was comparable in intensity with that produced by equivalent doses of morphine.

The results of these studies will be reported to the Committee on Drug Addiction and Narcotics, NRC, and prepared for publication. It is expected that because of its effectiveness in producing morphine-like changes when administered in minute quantities by the oral route, this drug will find many uses in experimental studies on addiction and habituation in animals (see below).

9. NIH-7446, ARC 1-B-19. (An N-allyl derivative of morphinan). In clinical studies done elsewhere it has been reported that the analgesic potency of this compound is comparable to that of morphine and that, like morphine, its effects can be antagonized by administration of nalorphine. Studies carried out at the Addiction Research Center to date indicate that, both with respect to euphoria production and suppression of abstinence from morphine, this compound is very similar to morphine, and therefore possesses a degree of addiction liability comparable to that of the latter drug. These results will be reported to the Committee on Drug Addiction and Narcotics, NRC.

Studies on the addiction liabilities of new drugs constitute a major part of the long-range program of the Addiction Research Center, and will be continued as heretofore.

III. Chronic Intoxication with Barbiturates, Alcohol, and Related Drugs.

During the current year work on drugs of this type has been concentrated mainly on the problem of alcoholism. Minnesota Multiphasic Personality Inventory profiles were obtained on 600 institutionalized alcoholics, narcotic addicts, and criminals without alcoholism or narcotic addiction (200 in each group). Factor analysis of the data revealed that the profiles of these three groups were very similar to each other and that most of the subjects could be classified in one or another of the following categories: (1) undifferentiated psychopath, (2) primary psychopath, (3) depressive psychopath, (4) schizoid psychopath, and (5) neurotic psychopath. Significantly, the alcoholics were more paranoid and neurotic, while the criminals were more schizoid than the narcotic addicts. Although addicts, alcoholics, and criminals have been impressionistically described as being a psychopathic personality the present study is the first to demonstrate this in an objective and quantitative manner. Further statistical evaluation of the results will be carried out before publication of these data.

A Habit and Attitude Inventory was developed and applied to 350 alcoholics and 100 narcotic addicts. A large number of differentiating items were found and their discriminatory reliability was established by cross validation tests on another set of 50 subjects in each of the two groups. Items and procedures require refinement before further data are gathered.

A study of the subjective effects of acute alcoholic intoxication was initiated this year, using the Addiction Research Center Inventory (ARCI) for this purpose. Two pilot studies were completed which were designed at three dose levels, with the aim of attaining and maintaining appropriate degrees of intoxication at three dose levels (high, intermediate and low), for a period of at least 2-1/2 years (well over the time required for administration of the ARCI). For this purpose the Purdue Pegboard (a measure of psychomotor performance) was employed in addition to an abbreviated form of the ARCI. By measuring changes in performance on both of these tests, beginning at various times after administration of the initial dose of alcohol, it was demonstrated that this dose plus the "maintenance doses" were sufficient to produce graded changes

in the measures employed. Therefore these dose schedules are now being used in systematic studies of the subjective changes occurring during acute alcohol intoxication periods. It is also planned to delineate the effects of alcohol in amounts comparable to those of social drinking on various measures of behavior, with concomitant monitoring of blood alcohol concentrations.

Clinical studies on barbiturates and other hypnotics were held in abeyance this year. However a study of the addictive liability of gluethemide (Doriden) in dogs was completed. Of 11 dogs, in which chronic intoxication at dose levels up to 3.5 grams per day was attempted, 6 died during the chronic intoxication period; of the remaining 5 dogs, one exhibited convulsions on withdrawal. Though Doriden appears to be much more toxic than barbiturates in this species, its addiction liability appears to be less. No further work with this compound is contemplated.

IV. Acute and Chronic Intoxication with Drugs Other than Analgesics, Barbiturates or Alcohol.

Studies in this area were primarily concerned with the psychotomimetic drugs during this year. As noted in the previous annual report, some of the congeners of LSD-25 (with substitution of alkyl, hydroxyl, or alkoxy groups of the acid amide radical) exert hypnotic effects in man contrasting with excitant effects in rodents and dogs. Of these, 4 mg of Lilly 23194 proved to be more efficacious than 200 mg of secobarbital in increasing hours of sleep after a morning dose. Unlike secobarbital, Lilly 23194 did not produce fast activity in the electroencephalogram and patients receiving the former were more readily awakened and exhibited less impairment of motor function. When administered simultaneously with LSD-25 neither Lilly 23194 nor secobarbital reduced significantly the mental effects of LSD-25. Actually, Lilly 23194 seemed to intensify the LSD reaction, although this was not statistically significant. This finding suggests either that Lilly 23194 has different sites of action from LSD-25, or that in sufficiently high doses it may produce psychotomimetic effects.

Another drug, elymoclavine, related to LSD-25 structurally, was also found to exert hypnotic effects in man, though excitatory in animals. In doses of 1 to 25 mcg/kg this drug produced no psychotomimetic effects, and drowsiness was reported by 9 of 12 subjects. A new supply of this drug has been obtained and further studies are planned.

Studies on two new congeners of LSD-25 (d-dihydro-lysergic acid diethylamide and 1-methyl-d-lysergic acid butanolamide tartrate) yielded data confirming previous conclusions on the lack of correlation between anti-serotonin and psychotomimetic potencies, and hence the lack of support for the "serotonin-deficiency" hypothesis of natural psychoses.

Of special interest in connection with theories of drug-produced or natural psychoses are the results of studies with psilocybin (O-phosphoryl-4-hydroxy-N-dimethyltryptamine). This compound, isolated and first studied pharmacologically by Swiss workers very recently, appears to be the active substance in the psychotropic mushroom used by Indians in Mexico. It is closely related to serotonin and bufotenine, the chief difference from the latter being that the hydroxyl group on the indole ring is on the 4- rather than on the 5-position. Because of such

structural similarities this compound may prove to be of value in the investigation of the possible role of serotonin and its precursors or metabolites in the production of psychoses. It was found that in adequate dosage psilocybin produces effects indistinguishable from those of LSD-25, though of shorter duration. Statistical analysis of dose-effect curves for peak pupillary (dilatation) and subjective (positive answers on questionnaire) changes reveal that LSD-25 is about one-hundred times as potent as psilocybin. Studies on cross tolerance between psilocybin and LSD-25 were also made on 5 subjects who were tested on single, relatively high equipotent doses of both drugs before and after one-week periods of daily administration of either drug, in amounts increasing from a very low dose to the control dosages. The results strongly suggest that, as in the case of LSD-25, tolerance to psilocybin develops rapidly and that after such tolerance has been established the subjects are also cross tolerant to either drug. However the results did not reach statistical significance on all measures. This study is now being replicated with a view to increasing the total number of subjects for greater statistical reliability, or, if necessary, to determining whether higher doses of psilocybin or longer periods of administration can produce greater degrees of cross tolerance to LSD-25.

V. Biochemistry of Addiction

As noted in the previous annual report, over 50 per cent of an injected dose of normorphine is recoverable in the urine in the "free" form, contrasting with only 10 to 15 per cent of "free" morphine; possibly accounting in part for the greater sedative effects of normorphine on chronic administration. Work on this compound during the current year was devoted to further study of the nature of the "binding" of normorphine excreted in the urine. As reported previously, it has been found that, unlike morphine, normorphine is not "bound" as a beta-glucuronide. Failure to release "bound" normorphine with strong acid at room temperature indicates that it is not bound as an N-glucuronide. Studies with mylase P (an ethereal sulfatase) also indicate that normorphine is not "bound" as a sulfate. Currently attempts are being made to isolate larger quantities of excreted normorphine from the urine by two methods: paper chromatography and precipitation with potassium carbonate with subsequent purification of the tarry precipitate by use of anion and cation exchange resins. Preliminary studies on urines with added normorphine indicate that the ion exchange technique may prove to be satisfactory.

Work was also continued during the year on methods for determining blood levels of epinephrine and norepinephrine and urinary levels of metanephrine, with a view to investigating the effects of opiates, chlorpromazine, chlorpromazine sulfoxide and other drugs on catechol amine activity and metabolism. Many difficulties have been encountered in attempting to use methods reported in the literature, such as that of Weil-Malherbe and Bone. Currently two other methods are being used: a modified form of a Von Euler and Floding oxidation technique, and the method of Crawford and Low in which manganese dioxide is employed as the oxidizing agent and amberlite resin IRC 50 as the adsorbent.

A sample of absolutely alcohol-free DPN was obtained and preliminary results with this purified hydrogen acceptor indicates that the enzymatic method (alcohol dehydrogenase) can be used successfully in determining levels of alcohol concentration in minute quantities of blood. Further studies on this technique and comparison of the results obtained with the standard dichromate method are being continued with a view to future applications in clinical studies on alcoholism.

VI. Neurophysiology and Neuropharmacology of Addiction.

These studies were designed to investigate primarily the loci of origin and neurophysiological mechanisms involved in the production of the barbiturate abstinence syndrome. As an initial phase of this project, a study was made of the changes in cortical thresholds for electrically induced seizures during chronic barbiturate intoxication and after abrupt withdrawal of the drug in cats. Collection of data was completed this year and indicate that daily production of seizures by trans-cerebral electrical stimulation gradually increases the threshold for induction of seizures in control animals, thus complicating interpretation of data obtained by this method during addiction cycles to barbiturates or other drugs. Furthermore, since no clear-cut fall in threshold was found to occur during the acute barbiturate abstinence period in this species, it appears highly unlikely that further studies with this technique will yield positive results, at least at the cortical level. However it is planned to extend these investigations to studies at subcortical levels in the future.

Another phase of this project has been concerned with the modifications of the barbiturate abstinence syndrome produced by ablations of the cerebral cortex. This has been attended by great difficulties because of the apparently increased susceptibility of decorticated cats to the deleterious effects of chronic barbiturate intoxication. Of 7 chronic decorticated cats, 6 died during the period of chronic barbiturate intoxication. The remaining cat exhibited no convulsions after abrupt withdrawal of barbiturates but displayed marked restlessness, tremulousness, and insomnia during the first few days of acute abstinence. Attempts to use rats for this purpose were unsuccessful. Of 12 intact rats started on 20 mg/kg of barbituric acid daily, 10 died and the remaining 2 exhibited no withdrawal phenomena after acute withdrawal of the drug. Currently attempts are being made to continue the project in dogs. Three completely decorticated beagle dogs have been started on barbital sodium, and 3 other dogs have had hemi-decortications so far. When completely decorticated, these animals will also be placed on barbital sodium daily.

VII. The Mode of Action of Central Nervous System Depressants.

The major purposes of this project are to investigate the pharmacological and the electrophysiological homogeneity or heterogeneity of the neural systems responding to electrical stimulation of the midbrain reticular formation, and the functional relationships between the activities of these systems (as reflected in measurements of electroencephalographic, electrocardiographic and vasopressor changes), and behavioral arousal.

To these ends, stimulus-response curves pertaining to electroencephalographic, electrocardiographic and vasopressor changes have been obtained in succinyl choline chloride curarized intact cats on artificial respiration before and after intravenous injection of graded doses of atropine (0.2-5.0 mg/kg); chlorpromazine (1-10 mg/kg); chlorpromazine sulfoxide (5-25 mg/kg); pentobarbital (4-12 mg/kg); epinephrine (1-3 mcg/kg); norepinephrine (1-3 mcg/kg); and a number of other drugs. For purposes of comparison with drug effects, stimulus-response curves (under non-drug conditions) were obtained in uncurarized cats on artificial respiration with transections of a spinal cord at the first cervical level (encephalé isolé) and electroencephalograms were recorded in uncurarized cats with transections through the midbrain at the intercollicular level (cerveau isolé).

In all of these studies the electroencephalograms derived from anteroparietal to midparietal calvarial leads were analyzed automatically in the frequency range of 1.5-30 cps by the use of the Offner analyzer, while blood pressures were recorded through transducer tracings derived from intra-arterially implanted polyethylene catheters, and cardiac rates by concomitant electrocardiographic tracings. In experiments involving electrical stimulation of the midbrain reticular formation, measurements were made of the changes produced by drugs in "delta per cent," defined as the ratio of the mean amplitude of the Offner pen deflections in the 1.5 to 3.5-cps range in the drugged animal to that of the undrugged animal. These measures were used in the calculation of changes in "threshold" of electroencephalographic response to reticular stimulation by a method that takes into account the changes in "base line" produced by these drugs (specifically, the increase in slow activity). Thus, "change in threshold" is defined as the difference between the stimulating voltage necessary to produce an infinitesimally small reduction of delta per cent in the undrugged animal and that necessary to reduce the delta per cent in the drugged animal to values

obtaining under undrugged unstimulated control conditions. Also "change in reactivity" is defined as the difference between the slopes of the stimulus-response curves obtained in the drugged and undrugged animal -- i.e., the difference in the magnitude of decrease in delta per cent produced by a given increment in stimulating voltage. The significance of all differences observed were calculated by appropriate statistical techniques.

The results may be considered in relation to the primary objectives of this project. Atropine produced marked slowing of the electroencephalogram, elevated the threshold of activation and increased the reactivity of the EEG to electrical stimulation of the midbrain reticular formation. This drug also elevated the threshold for, and increased the reactivity of the vasopressor response to such stimulation. A close parallelism was demonstrated between such central changes and the peripheral muscarinic blocking effects of graded doses of atropine, suggesting that the neural systems involved in the central responses to midbrain reticular stimulation are mediated in part through muscarinic synapses, although transmission through non-muscarinic synapses must also be assumed since graded electroencephalographic and vasopressor responses

could be obtained under atropine in spite of complete peripheral muscarinic blockade. Also a closer parallelism was found between the norepinephrine potentiating actions of chlorpromazine and chlorpromazine sulfoxide and the central depressant effects of these drugs than between their adrenergic blocking actions and their central effects. These data suggest that norepinephrine may also be involved in neurohumoral transmission, but, if so, such transmission is more likely to be inhibitory rather than excitatory.

In the intact curarized cats, reticular stimulation produced two kinds of changes: reduction of the amplitude of all activity and the acceleration of frequencies. However these normally associated changes could be dissociated by certain of the drugs employed. Thus acceleration of frequencies by reticular stimulation was not observed under atropine while reduction of amplitude at all frequencies (below 22 cps) did occur. After administration of pentobarbital acceleration of frequencies was observed but the reduction of amplitude at lower frequencies was accompanied by augmentation of amplitudes at higher frequencies. From these studies it appears that the neural systems responding to midbrain reticular stimulation are not homogeneous either pharmacologically or physiologically.

As already noted atropine, while elevating the threshold of electroencephalographic activation, enhanced the reactivity of the systems involved in this response to midbrain reticular stimulation. This was found to be true also for chlorpromazine and pentobarbital although these drugs elevated the threshold of the vasomotor response and decreased the reactivity of the systems involved in its mediation. Furthermore comparisons of the electroencephalographic responses to midbrain reticular stimulation in the *encéphale isolé* preparation (without drugs) with those obtained under atropine, chlorpromazine and pentobarbital in the intact curarized animal revealed that the augmentation of reactivity produced by these drugs in the latter was absolute -- i.e., the electroencephalographic responses to midbrain reticular stimulation in the drug treated animals were greater than would be expected in an undrugged animal, with slow activity comparable to those produced by the drugs in the resting state. Still, it is known that in contrast to the other drugs, atropine does not elevate perceptibly the threshold of the behavioral response to "arousing" stimuli. Therefore it would appear that neither elevation of threshold of EEG activation or augmentation of the reactivity of the EEG to reticular

stimulation can be correlated in an invariable way with changes in behavioral arousability, nor would it appear that either simple reduction of amplitude or acceleration of frequencies of the EEG is an invariant correlate of behavioral arousal. On the other hand it was found that the effects of high cervical transection (*encéphale isolé*) and intercollicular midbrain transection (*cerveau isolé*) could be mimicked by chlorpromazine and pentobarbital respectively. Therefore it is conceivable that actions of these drugs on the input into the reticular activating system, and/or their effects on the caudal projections of this system, may be more closely correlated with their effect on behavioral arousal. To test this hypothesis it is planned to investigate the effects of midbrain reticular stimulation on behavior and the effects of drugs thereon, as well as on evoked potentials in the midbrain, in the chronic decerebrated cat preparation.

VIII. Psychological Studies of Addiction

In addition to the work on alcohol already described (see Section IV above), extensive studies on human subjects were conducted with the Addiction Research Center Inventory for measuring subjective effects of drugs (ARC1). The drugs

employed in these studies include placebo, LSD-25 (in two doses), pyrabexyl compound (in two doses), morphine, pentobarbital, amphetamine, chlorpromazine (multiple daily doses), as well as alcohol. Thus far 100 subjects have been studied under all conditions except alcohol and morphine, and it is hoped to complete the quota of subjects receiving all drugs shortly. Currently arrangements are in progress with the Statistical Processing Servicing Center and the Psychopharmacology Service Center of NIMH for the development and cross validation of empirical scales for each drug. After these steps in the analysis of the data are completed it is planned to carry out a factor analysis of the empirically derived scales. This project is of great potential importance, not only because it provides a reliable instrument for quantitative measurement of the subjective effects of drugs of particular interest to this Center, but also because of the opportunities the data provide for testing of basic theories of behavioral change in general and drug-induced changes in particular. Thus, the data obtained with the ARCI on LSD-25 (1.0 and 1.5 mcg/kg) have been used to investigate a factor analytic theory of "causation." According to this theory positively scored items on the ARCI

reflecting the "primary" effects of LSD-25 should be more highly inter-correlated than positively scored items reflecting "secondary" effects of the drug, and these in turn more highly inter-correlated than positively scored items selected at random. Also, the loadings of the "secondary" items on an empirically derived factor should be dependent upon the loadings of the "primary" items on that factor. Using items that differentiated between control and LSD-25 conditions at or beyond the 0.0025 level as a class representing the "primary" effects of LSD-25, and items for which the frequency of "true" responses under LSD-25 was greater by 10 than for control conditions as a class representing the "secondary effects" of LSD-25, with the application of appropriate statistical techniques, confirmatory evidence was obtained for both predictions from general factor analytic theory. Also applications of factor analytic methods to the data obtained with the ARCI on schizophrenic patients and on postaddicts under control and LSD-25 conditions revealed that with respect to the main factor, the schizophrenic subjects tested significantly higher than the postaddicts without drugs, but not when comparisons were made with postaddicts under the influence of LSD-25.

Whether or not the apparent similarity between schizophrenia and the changes produced by LSD-25 is specific for that drug remains to be determined by extension of similar analytic methods to the data obtained with other drugs. In addition, factor analysis provided some evidence that certain personality characteristics found on the control conditions are intensified or accentuated by LSD administration. It may be noted too that, in addition to detecting the well known subjective effects of LSD-25, there is some evidence that this instrument can bring out changes concerned with tactile, thermal, olfactory, appetitive and sexual changes as well as interpersonal and attitudinal alterations which have previously not been emphasized in the literature.

Other studies on human subjects during the year included continued measurements of Minnesota Multiphasic Personality Inventory profiles on addict physicians, and preparations for investigations on probability learning in man. The work on addict physicians has been progressing very slowly, because in the past 30 days or more were allowed to elapse before the tests were administered to physician patients in the hospital after admission. It has now been decided to administer the

tests to such patients within a week after admission, as well as after 30 days, to determine whether such early profiles can be used -- a procedure which would facilitate the acquisition of a suitable number of subjects. The purpose of the projected study on probability learning in man is to compare the variables controlling decision making in psychopaths with those in normal human subjects, particularly with reference to whether or not the behavior of the psychopath is controlled to a greater extent than normally by the objective "odds" in a given situation, and whether the psychopath is more responsive to negative than to positive reinforcement. Later it is planned to study the effects of drugs upon these variables. Apparatus for this study has been completed and a few pilot investigations have been made. However the results to date are not sufficient to warrant any conclusions.

In animals, work has continued on the problem of the possible interaction of effects of drugs upon auditory discrimination with their effects on tone-shock evoked conditioned inhibition of bar-pressing for food ("anxiety", "conditioned emotional response"). Attempts to train rats to discriminate "tone-on" and "tone-off" by use of a shock-escape technique

proved to be unsatisfactory. The design has been changed in several ways, and it is planned also to try appetitive reinforcement should satisfactory results with aversive reinforcement not be forthcoming. A great deal of time has been devoted during the current year to statistical analysis of the enormous body of data obtained in previous years with various drugs. In general the previous conclusions have been upheld. Although the effects of drugs on the conditioned inhibition appeared to depend to a considerable extent on the particular characteristics of the tone used as the conditioned stimulus; the opiates and opiods produced the greatest reduction in this measure of "anxiety," and (except for pentobarbital) it is this class of drugs only for which significant dose-effect curves can be obtained. Pentobarbital produces a pattern somewhat similar to that of the opiate series, but only at 20 minutes after injection. Chronic reserpine medication produced much less effect even when administered at three times the dose-level reported to be effective by other investigators. Nalorphine, amphetamine, cocaine, LSD-25, and chlorpromazine did not yield significant dose-effect responses. However final interpretation of these data must await the outcome of the studies on the effects of drugs upon auditory discrimination.

During the year a replication was made on a part of a study conducted previously which was concerned with the role of "internal stimuli" produced by drugs in the rate of acquisition and extinction of conditioned responses. In studies with morphine and amphetamine on rats conditioned to press a Skinner bar for food, it had been shown that extinction occurred faster when drug conditions (or no-drug conditions) were the same during acquisition and extinction than when they were different. Another interesting finding was that in rats trained to press the bar for food under placebo conditions, bar-pressing rates under amphetamine during extinction were equal to or lower than the rates found under placebo extinction, a finding which suggests that under certain conditions amphetamine may be a "depressant" rather than a "stimulant." This finding was confirmed in the present study.

In addition, a study was initiated this year on the effects of autonomic blocking agents upon traumatic avoidance conditioning. The hypothesis to be tested is that while autonomic effector discharge is not essential for the acquisition of a traumatic avoidance response, it serves to increase the resistance of the response to extinction. To test this hypothesis

It was planned to compare rates of acquisition and extinction of a traumatic avoidance response in normal rats and in rats treated with an autonomic blocking agent, "Ecolid." In preliminary studies an attempt was made to determine the autonomic blocking dose of Ecolid for this species. Surprisingly, it was found that even in large doses (5 mg/kg) this compound did not produce slowing of cardiac rate in the normal animal. Since the basic studies on this drug in the literature had been made in animals under barbiturate anesthesia, the effects of Ecolid on cardiac rate were investigated in rats pretreated with a small dose of pentobarbital (5 mg/kg). Under such conditions it was found that Ecolid did indeed reduce cardiac rates significantly. At present the reasons for such interaction between Ecolid and pentobarbital are not clear. Further studies are in progress in which the effects of Ecolid upon vasopressor responses to tetramethyl ammonium chloride in rats pretreated with methyl atropine will be used as a measure of its potency as an autonomic blocking agent. It is conceivable that the failure to demonstrate autonomic blockade by Ecolid in normal rats is due more to the unsuitability of cardiac rate as an indicator of such effects than to any necessary dependence

of these effects upon pretreatment with pentobarbital. However, if the latter should prove to be the case, the projected study on traumatic avoidance conditioning may have to be redesigned to make provision for "balancing out" the effects of pentobarbital.

18. Conditioning Factors in Addiction and Habituation (Relapse)

This project was designed as an attempt to test, insofar as it is possible in animals, some of the basic postulates of a theory of relapse to the use of addicting drugs in man. Briefly the theory holds that, in part at least, relapse represents a conditioned response to environmental stimuli that were previously associated with the periodic reduction of abstinence distress consequent to addiction. It is postulated that once physical dependence on a given drug is established, each dose of the drug serves to reinforce whatever behavior is instrumental in bringing about the administration of the drug. Furthermore it is postulated that the strength of such "primary" reinforcement, as well as the strength of "secondary" reinforcement by environmental stimuli regularly associated with the former, varies directly with the "effort" expended in the performance of the instrumental response. In man, special social conditions

may provide sources of tertiary and even higher orders of reinforcement, so that the original basis for inveterate recidivism may become greatly obscured. However there appears to be no reason why animals cannot be used in the study of "primary" and "secondary" reinforcement, provided the species selected is capable of generating physical dependence on drugs and of making the required discriminations.

In the present investigation the rat has been used because it has been reported that this species develops physical dependence on morphine, and because of the wealth of information available on instrumental and operant conditioning in this species. In studies initiated last year it was found that reliable evidence of physical dependence on morphine administered subcutaneously once daily could be obtained only when the daily dose was maintained at a level of 200 mg/kg. Also several methods were tried in which differential preferences for goal boxes identified with visual cues might be developed by addicted, but not by non-addicted rats, as a consequence of reinforcement by subcutaneous injections of morphine. However these were unsuccessful, because in the design, trapping of the rats and subcutaneous injection of morphine was interposed

between the start and the goal boxes. During the present year an attempt was made to circumvent this difficulty by subcutaneous injection of morphine (or saline) before placing the animal in a small compartment, egress from which could be accomplished by pressing one of two levers, the "correct" one depending on the substance injected. The animals learned to make this discrimination readily, but comparisons of the number of lever presses made (up to a total of 10 presses) on "test" days during which no egress was permitted revealed that they developed a distinct aversion to the lever associated with morphine injections. The most plausible explanation for this unexpected result is that because of the highly hypertonic (6 per cent) solution of morphine that was used, pressing of the "morphine" lever was associated with pain rather than relief of abstinence distress. Because subcutaneous injection of morphine introduced such difficulties, an attempt was made to train rats to operate a Skinner bar which in turn activated a pump mechanism that delivered intraperitoneal injections of morphine through an implanted polyethylene catheter. After about two weeks, however, it was found that the intraperitoneal end of the catheter was completely occluded by a thick fibrous membrane. Hence, this technique was also abandoned.

Following receipt of information of the extraordinary potency of the morphine-like benzimidazole derivative, I-G-2 (NIN-7607, see section II above), preliminary studies were made which revealed that water-deprived rats will drink a 5-mcg/cc solution of this drug as readily as pure water and that effects identical with those of morphine can be observed in these animals within four to seven minutes after commencement of drinking. In view of this discovery the project was redesigned completely. Rats are now maintained on morphine at a dose level of 200 mg/kg (100 mg/kg twice daily) and oral ingestion of a 5-mcg/cc solution of I-G-2 is used as the reinforcing agent each morning (several hours before the first daily injection of morphine) in two types of experiments. In one of these, rats are trained to press a bar for continuous liquid reinforcement after water-deprivation, the liquid being either pure water or the I-G-2 solutions on different days, with provision of discriminatory tactile cues for each kind of reinforcement and a clicker activated by the bar as a secondary reinforcer associated with the delivery of I-G-2. On "test" days the animals are satiated with water prior to presentation of the bar with the discriminatory cues. Control rats are treated in exactly the same manner, except that instead of

...they are injected twice daily with saline. The critical dependent variable in this experiment is the differential bar-pressing (and liquid drinking) rates of addicted and control animals when water satiated. In its present form this experiment has been in progress only about one month, which has provided opportunities for only five test days. At present there appears to be a slight trend in the direction of higher bar-pressing rates for the addicted animals on water satiation days compared with the controls. However there is as yet no evidence of discrimination between the "water bar" and "1-G-2 bar." If clear-cut evidence of discrimination (in favor of 1-G-2) does develop the experimental and control rats will be divided into two subgroups each, one of which will continue on the present schedule of one-to-one reinforcement, while the other will be placed on a fixed ratio or variable interval schedule with a view to subsequent examination of this "effort" variable in the determination of "relapse."

In the other experiment, groups of morphine addicted and nonaddicted rats are deprived of water for 20 hours daily and are then placed in cages permitting the choice of one or another of two compartments, at the end of which tubes are

available for drinking, one of them identified by visual and tactile cues. In the first phase of this experiment either tube may contain water or the 5-mcg/cc solution of I-G-2, the purpose being to determine whether or not, without training, rats in either group exhibit a preference or an aversion for the I-G-2 solution, or the discriminatory cues, independently. This phase, which has extended over about 50 days, is now almost completed and the results indicate that without training the rats show neither an aversion nor a preference for either the solution or the cues. In the second phase of this experiment which has just begun, rats will be presented with only the cue-identified tube containing I-G-2 solution daily for four days, and tested for tube preference by presentation of both I-G-2 and water tubes on the fifth day, and such cycles of five days' training and testing will be continued indefinitely. The critical variable here is the relative amount of drinking from the two tubes on the test days as a function of the number of training trials. It is expected that this experiment will serve to provide an additional measure of the "primary" reinforcing potency of the I-G-2 solution and the relationship of this to the presence or absence of physical dependence on morphine.

X. Effects of drugs on "Mental set"

This complex procedure, which may be regarded as a method for quantifying "attention," involves measurement of auditory-manual reaction times following visual "warning" signals at different foreperiods under "irregular" and "regular" conditions. In previous years it was found that a number of drugs, including LSD-25, morphine, and pentobarbital, produced changes in "mental set" of nonpsychotic postaddicts which were similar qualitatively though not quantitatively to those obtaining in schizophrenic patients under no-drug conditions. These results suggested that the disturbance of "mental set" measured by this procedure is not uniquely correlated with schizophrenia. To obtain additional evidence on this point, a study of the effects of chlorpromazine therapy on the behavior and "mental set" of 6 nonaddict chronic schizophrenic patients was undertaken. The effects of the drug (up to 600 mg/day for six weeks) were studied by employing a balanced design in which half of the group received the drug and the other half a placebo during the first treatment period, following which the treatment conditions were reversed. One of the subjects had to be dropped from the study because of the development of toxic side-effects. The data obtained in

the remaining 5 have not yet been analyzed statistically, but in their raw form they appear to give no indication of "improvement" in mental set which can be attributed to chlorpromazine, although at least temporary improvement in some aspects of behavior was observed in some of the patients. The statistical analysis of the enormous body of data acquired on "mental set" this year and previously will be completed before any additional work with this method is undertaken.

Abraham Wikler, M.D.
Acting Director

6 November 1959

Summary Report

Calendar Year 1959

Laboratory of Socio-environmental Studies

John A. Clausen, Chief

The development of the Laboratory's program in 1959 has perhaps been most impressive in the area of family studies, both in the progress made in studies previously undertaken and in those more recently initiated. These researches touch upon such substantive problems as (a) the structuring of interpersonal relationships in selected samplings of normal families, (b) the influence of maternal employment upon the mother's attitudes and her performance of the maternal role, and (c) husband-wife communication and interaction in the period antecedent to the hospitalization of either spouse for mental illness, and upon such methodological problems as (d) the validity of retrospective data on early parent-child relationships and (e) the development of observational techniques to supplement and cross-validate interview techniques for the study of family relationships. This concentration of effort upon the description and analysis of family patterns (though by no means to the exclusion of other areas of research) is in part a reflection of the strategic importance of the family as the group through which broader social and cultural influences upon personality development and behavior are mediated, and in part a matter of phasing of the long range Laboratory program.

The ultimate goal of the Laboratory's program is to delineate and study the social norms and processes which (a) influence the development of personality and the distribution of mental health and illness, (b) affect the individual's ability to carry out normal family, occupational or community responsibilities and activities, and (c) govern the ways that disturbed or ill persons are perceived, defined and dealt with at various stages of the life history. Past research has indicated a number of significant correlations between grossly classified social-cultural phenomena and the phenomena of mental health and illness, but the specific linkages remain for the most part obscure. For example, rates of treated schizophrenia are inversely related to social status in the United States and Great Britain. Parent-child relationships exhibited by families which contain schizophrenic patients appear to differ from those of families with normal children; and family patterns also appear to differ by social status groups. But our knowledge of the distribution of such family patterns in the general population is meager, and knowledge of the specific effects upon personality development of various combinations of family patterns is almost non-existent. More systematic study and more adequate specification of what goes on in the normal family is necessary, then, as a prelude to more sophisticated investigation of the epidemiology of mental illness. Hence, at the present stage of our knowledge, methodological studies

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

REPORT OF THE RESEARCH WORK OF THE
LABORATORY OF PHYSICAL CHEMISTRY
DURING THE YEAR 1911

The following report contains a summary of the work done in the Laboratory of Physical Chemistry during the year 1911. The work was carried out under the direction of Professor J. H. Noyes, and the results are presented in the form of a series of papers, each of which is a separate contribution to the literature of physical chemistry.

The first paper, by J. H. Noyes and J. W. Smith, is entitled "The Heat of Formation of Hydrogen Peroxide from the Elements." This paper is a continuation of the work of Noyes and Smith on the heats of formation of various compounds, and it presents the results of a series of experiments which have been carried out in the laboratory of physical chemistry at the University of Chicago.

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and systematic analyses of the intercorrelated networks of variables that constitute family patterns seem especially strategic approaches to the pursuit of our long range goals.

Hand in hand with the description and analysis of social structure and interpersonal networks must go the development of more adequate theories of personality development. While the social scientist looks to the psychologist and the psychiatrist for aid in conceptualizing personality organization and dynamics, he has a special responsibility for analyzing and formulating the relationships between social structure and personality development. If certain combinations of relationships and experiences lead to distinct behavioral responses (delinquency, drug addiction, aggressive striving, etc.), linkages will require conceptualization of both the social-experiential input and the behavioral output.

Thus far the Laboratory's program has been focusing on the analysis of the "input" variables, and for some years our primary efforts are likely to continue here. It may be noted, however, that the research of Campbell and Yarrow on children's peer-group relationships, the new study by Burton on processes of internalization of standards and values in children, and Rosenberg's research on self-images in adolescence deal to a considerable degree with social behaviors and psychological processes on the "output" side.

Before turning to consideration of the specific projects under way in the several sections, it may be noted that during 1959 the Laboratory was fortunate in being able to recruit four well qualified younger social scientists representing a broad range of skills in social psychology, sociology and anthropology. Their research is still largely in process of formulation or early phases of data collection, but each man comes with broad research goals well envisioned.

Office of the Chief

During 1959 the field work was substantially completed on the long term study of the impact of mental illness on the family, as was the coding of data relating to family status and functioning and to the spouse's perceptions of the patient's behavior antecedent to hospitalization. An initial report of the analysis of the marital relationship traced the sequence of behavioral changes and the efforts of the spouse to communicate with the patient and cope with the family crisis. The sharp difference between confronting physical illness and confronting mental illness in a spouse is pointed up by the fact that, in many of the families studied, the patient's symptomatology entailed a direct assault upon the marital ties as such; conflict or progressive alienation characterized the marital relationship after the onset of mental illness even where the previously existing marital tie had been

close and the marriage a happy one. Subsequent analyses will attempt to assess the consequences, for the family unit and for the patient, of various modes of defining and coping with the illness.

The Laboratory Chief attended the Fourth World Congress of Sociology in Stresa, Italy, and subsequently visited a number of centers of research in social psychiatry in Scandinavia, France, and Great Britain. Out of this experience will come a general examination of the interrelationships between theoretical orientations of psychiatry and the organization of the psychiatric profession, on the one hand, and the development of community mental health services and of psychiatric research programs, on the other.

Dr. Melvin Ember, who joined the Office of the Chief in September, will apply the research techniques and concepts of the anthropologist to the study of social influence in interpersonal behavior.

Community and Population Studies

Dr. Melvin L. Kohn

The long range interests of this Section include the study of social organization, social differentiation and dominant cultural emphases (values, life styles, etc.) as these influence the development of personality, the distribution of various forms of deviant or problematic behavior and the development or utilization of various techniques for coping with problematic behavior.

Drs. Kohn and Clausen, and Miss Eleanor E. Carroll, have for the past four years been studying the relationship of social class to child-rearing values and practices in 400 Washington families, each with a child aged 10-11 years. Following the previously reported analyses of social class differences in values parents hold for their children and in the ways in which they exercise their authority over the children, the past year's work has focused on the patterns of limit setting and emotional support vis-a-vis the 10-year-old child. Of considerable potential significance is the finding that while mother-child and father-daughter relationships do not markedly differ by social status, the father-son relationship seems more often close and emotionally supportive in the middle class than in the working class. Whether one considers reports of relatively objective phenomena such as the amount of time spent by the father with his son or more subjective feelings on the part of both parents and sons of closeness and understanding, the working class father seems to be less involved with his son--at least at age 10 to 11--than does the middle class father. This finding runs counter to previously accepted statements suggesting that the son of the working class father identifies or feels closer to him because he can more readily comprehend the father's occupational activities and because the father is more often at home. Further analysis of these data will examine other characteristics which seem to influence the perception

of authority and affectional patterns, consensus among mother, father and child with reference to such perceptions, and the probable implications of these patterns for personality development. An effort will be made to secure some additional data by direct observation in selected households.

A second study, dealing with adults rather than children and the occupational realm rather than the family, attempts to look at the relationship of social structure to personality from quite a different perspective. Dr. Stephen Boggs has developed and pre-tested a questionnaire for use in a study of the ways in which the meaning of a man's job and work career are related to his emotional and physical health. He now plans to administer this questionnaire to a sample of 180-200 men in their middle working years.

Dr. Erwin Linn has continued analysis of data on patient characteristics, treatment, and duration of hospitalization among functional psychotics first admitted to Saint Elizabeths Hospital in the District of Columbia from 1953 through the first half of 1956. Dr. Linn this year concentrated his attention on the question of whether there have been changes, following the advent of drug therapy in the relationship between patients' social characteristics and the probability of their release from the hospital within one year of admission. Various factors--such as marital status, race, sex, job stability, education, rural vs. urban background, and social mobility--which had been highly associated with the probability of release in the period before the advent of drug therapy, were found to be of diminished significance in the later period.

Dr. Gordon Allen, the geneticist attached to this Section, has continued the analysis of the data collected in his twin study of mental deficiency. He has also served as genetics consultant to other laboratories and in connection with such consultation has developed quantitative methods for the analysis of zygosity.

Social Developmental and Family Studies

Dr. Marian Radke Yarrow

The work of this Section has continued in two major areas of research on the family--methodological problems of data collection and problems of extending and refining variables conceptualizing parent, child and family as a group. A third area has been the study of the impact of immediate settings outside the family upon family members.

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The particular problems of family research on which we are currently working stem from a number of deficiencies of methodology in this field: (1) Research on parent-child relations is rarely done in the natural setting of the home and rarely deals directly with intrafamilial behavior. It relies heavily upon interview and questionnaire procedures. (2) The data are generally the reports of a peculiarly involved reporter, the mother. (3) Research often requires of the mother remarkable synthesizing and interpretative powers in providing the interviewer with the data he desires. She is asked to give her modal parental behaviors, and to summarize highly complex and variable interactions and feelings extending over long and indefinite time periods. (Is the home permissive, is she strict in the exercise of control over her child, etc.?) (4) Research on child-rearing has been channeled into an unvarying set of variables which tend to dominate research designs.

In a number of studies we are trying to attack some of these problems. In 1958 research was begun on observational techniques in the natural family setting. It has continued in the past year. Practical and technical factors in the observer role are being examined (gaining access to the family, developing appropriate observer-observed relations, developing specific techniques of observing). In a small group of families data were gathered on areas of authority, discipline and responsibilities, using participant observations, interviews and questionnaires. In preliminary work with the data we are attempting to combine observational and interview data in ways which will make it possible to analyze disciplinary processes as to philosophy of parent, actions of parents, and what it is in the situation which translates (or prevents the translation of) philosophy into behavior; and further to include dimensions of the child's definition of the situation and his participation in the process--in evoking parental response and in responding to parental actions.

Much of our work thus far on observational methods has been preliminary to extensive data gathering and definitive project design. This exploration will continue in the next year with the expectation that a design will be developed, combining technical data-gathering problems and a substantive problem of child development. Mr. Gillette and Dr. Yarrow have been engaged in this work. Dr. Roger Burton, who joined the staff this fall from the Laboratory of Human Development, Harvard University, will also be working on problems in this area.

A project concerned with problems inherent in data-gathering which relies on mother's retrospective reporting on child and family relations has progressed during the past year. (Drs. Campbell and Yarrow) The research questions we are asking are: Is it possible for the mother to reconstruct accurately the earlier periods in her child's

life and her relationships with her child; what are the changes which take place in the recall, and of what are they a function? Of the project sample of 240 families, data gathering has been completed on 85 families; this includes processing of data collected at earlier periods (2 to 30 years ago) in tests, observational records and interviews, and conducting interviews with mother obtaining their reconstructions of the past. Data collection will require nine to ten more months. During this time analysis will also be proceeding.

Several projects (Yarrow and Gillette) focus on the mother role. Specifically, the focus is on how the mother's personal goals in her various adult roles (wife, career, woman) relate to family functioning and child-rearing, and how social factors (social class and race) modify the mother role. During this year data collection was completed on a questionnaire sample of 700, and an interview sample of 100 mothers. Coding and machine analysis of questionnaires have been completed. It is anticipated that interpretations and reports of findings will be completed in the next six months. The coding of interviews will require much of the coming year. Initial interpretations of questionnaire findings in limited areas suggest that variables of social class and of race within matched classes are more powerful than the variable of maternal employment status in explaining differences in family role performance, mother's confidence regarding her understanding of the father's point of view in family issues, attitudes of the mother regarding career and mother role combinations.

A new project begun this year is an investigation of processes of internalization of standards and values in children. In this area, Dr. Burton is using experimental situations for measuring the child's resistance to temptation and guilt. Child rearing variables will be investigated, through interview and observational methods, as antecedents of the child's superego behavior.

The interest of members of this Section in the impact of immediate social settings and of peers upon the child has received less attention this past year. We have brought to completion an investigation of the nature of the child's perceptions and understanding of his human environment (the characteristics and motives of the persons with whom he interacts) (Campbell and Yarrow). Reports are in preparation on developmental aspects of cognitive processes, sex differences in social perceptions, and interactions of children's social perceptions and behavior in establishing relationships in peer groups. Boys show more highly organized initial impressions of their peers than girls, and are more likely to make inferences about personality and motivational factors in others. Boys more than girls are selective in their perceptions of peers in terms of aggressive, rebellious, nonconformity aspects.

Girls tend to stress patterns of nurturance in others. Sex differences and individual differences in social perceptual characteristics are more pronounced than age differences between 8 and 13 years. The child's skill in social relations (defined in terms of his reputation among his peers) is related to his ability to synthesize more and often divergent cues in the social environment and to assimilate them into organized impressions of persons.

The full professional staff of the Section has been recruited. The research workers now represent considerable variation in theoretical background and methodological experience and have at the same time common interest in the problem areas of the Section.

Social Studies in Therapeutic Settings (CIB)

Dr. John A. Clausen (Acting Chief)

The work of this Section is devoted to the study of the social environment within which therapy takes place. Three general approaches are utilized in our mental hospital research: the broad sample survey methods, represented by the work of Dr. Fearlin; the method of controlled experimentation, represented by the work of Dr. Schooler; and the method of participant observation and unstructured interviewing (akin to the anthropological method) represented by the work of Dr. Lbchen.

The survey approach has been utilized by Drs. Fearlin and Rosenberg in their investigation of staff attitudes and behavior in a large mental hospital. While the evidence is clear in indicating that the mental patient's contact with nurses, psychiatric aides, and nursing assistants may have an important bearing upon the course and outcome of the mental illness, relatively little is known about the factors which contribute to the attitudes and behavior toward patients of nursing personnel on the ward. Hence, a questionnaire for nursing personnel has been developed which is designed to provide information about staff perceptions of patients, preferences for types of patients, methods used to influence patient actions, conceptions of causes of mental illness, sense of personal efficacy in treating patients, social distance or intimacy with patients, receptivity to change in hospital practices, belief in the efficacy of hospital treatment, attitudes toward authority relationships, salient problems in work, work satisfactions and dissatisfactions, and other information relating to a custodial or humanistic approach and to job morale. In addition, the questionnaire contains items on personal background and demographic characteristics, as well as certain simple personality measures. After three pre-tests (one involving a ten per cent probability sample of the hospital), the questionnaire was administered to the total nursing staff of Saint Elizabeths Hospital. One initial administration and three follow-ups yielded a return of 1138 questionnaires, representing 87

per cent of the nursing population. In addition, Ward Information surveys have been collected on all 156 wards in the hospital, and data are being collected on staff behavior patterns. The survey and ward information data have been processed and are now being subjected to statistical analysis. Throughout this study we have had the whole-hearted cooperation and unqualified encouragement of the supervisory nursing personnel at Saint Elizabeths Hospital.

The method of controlled experimentation is represented by the work of Dr. Schooler. Dr. Schooler, who joined our staff in April, has come to us with training in experimental social psychology in the mental hospital gained at Montrose Veterans Hospital. Since his arrival, Dr. Schooler has initiated an experimental study of affiliative behavior among 60 chronic schizophrenics at Springfield State Hospital. Response to the experimental stimulus will be related to the patient's present intellectual and emotional functioning, as measured by the Wechsler Adult Intelligence Scale, the Rorschach, and a Word Association Test, and to his pre-morbid level of social adjustment, as determined by a study of his records.

Dr. Löchen, who joined our staff as a Visiting Scientist in July, used the methods of participant observation and unstructured interviewing with great effectiveness in his work at the Dikemark Mental Hospital in Oslo, Norway. He is interested in comparing certain aspects of organizational structure in Norwegian and American mental hospitals. In his work in Norway, he observed that staff members performing different functions in the hospital often interpreted the success or failure of the introduction of new therapeutic programs differently. Dr. Löchen reasons that the likelihood that such therapeutic programs will be introduced into mental hospitals, or, if once introduced, will be effective, will depend upon how people occupying different functional positions in the hospital will interpret or react to these innovations. He plans to pursue this question in an American mental hospital.

The work of this Section includes not only the investigation of the social organization and functioning of the mental hospital, but also interdisciplinary research on a variety of mental health phenomena. In particular, Drs. Rosenberg and Pearlman have collaborated with several members of the Personality Development Section of the Adult Psychiatry Branch on a study of how competent adolescents cope with the problems generated by the transition from the senior year of high school to the freshman year of college. The aim is to define those factors in the subject's early experiences, present personality structure, and current environment which are related to his methods of coping with stress during the period under study. Interviews with students and data analysis are being conducted by personnel from the field of psychiatry, psychology, psychiatric social work, and sociology.

Dr. Rosenberg has been engaged in a study of self-images and self-ideals in normal adolescence. He is studying the impact of cultural background, roles and statuses, family experiences, and unique experiences upon the adolescent's level of self-esteem, and attempting to determine the relationship of self-esteem to measures of tension, depression, and neuroticism. He is also concerned with learning about the impact of self-esteem upon interpersonal relationships and socially significant opinions, attitudes, and values. On the basis of preliminary studies with small samples, it has proved possible to develop reasonably satisfactory Guttman scales of the following dimensions: self-esteem, preoccupation with self, interpersonal inhibition, certainty of self-image, stability of self-image, imagination, and depression. In addition, questionnaire items dealing with a number of other relevant areas have been developed. The administration of this research instrument to a large sample of normal adolescents during the coming year is planned.

During the year the Section was host to Dr. Cyril Sofer, a Visiting Scientist from Tavistock Institute of Human Relations in England. Dr. Sofer visited with us for a period of three months. His broad experience and keen intelligence proved most helpful to us in the formulation and clarification of our research problems, and he applied his knowledge of group processes to Dr. Elkes' program at Saint Elizabeths Hospital.

BIOMETRICS BRANCH

ANNUAL REPORT FOR CALENDAR YEAR 1959

General

The Biometrics Branch has made continuing progress in each phase of its program which consists of the following activities: (a) collecting, processing, and analyzing data on the extent of the problem of the mental disorders, particularly with regard to patients under treatment in mental hospitals, in outpatient psychiatric clinics, in general hospitals with psychiatric services, and in public and private institutions for mental defectives and epileptics; (b) providing consultative services to State research bureaus on the organization of statistical services, on the design of follow-up, evaluative and other special studies; and (c) providing consultative services on design of experiments, analysis of experimental data, development of mathematical models to the other Branches and laboratories of the Institute, particularly to personnel engaged in basic and clinical research.

The Branch has made considerable progress in the collection of data on patients under treatment in mental hospitals and clinics. Nevertheless, the task of collecting data on the fate of patients admitted to such facilities remains an extremely difficult task because of the lack of certain essential knowledge on the etiology and epidemiology of the mental disorders and the absence of instruments that can be used in comparable fashion from institution to institution to determine severity of illness and to characterize the psychologic status, the degree of psychiatric disability, social and familial adjustment and physical condition of patients at various intervals following onset of disease. As more new therapeutic programs (drugs, use of day and night hospitals, half way houses, open hospitals, etc.) and treatment facilities are introduced into hospital and community programs, the task of obtaining data on people under treatment becomes increasingly difficult and complex, and data derived from separate treatment facilities, such as public mental hospitals and clinics and psychiatric services in general hospitals, become increasingly difficult to interpret. It has become quite apparent that state mental health and state mental hospital authorities must develop statistical reporting programs that will coordinate basic data on patients under treatment in all known psychiatric treatment facilities in their jurisdictions and will include appropriate follow-up data on the various classes of patients. The Branch has initiated the development of a program in the state of Maryland which would involve the coordination of individual patient reports from outpatient psychiatric clinics, state mental hospitals, private mental hospitals, general hospitals with psychiatric services and the Veterans Administration for research studies and special tabulations.

With the increasing interest in specific areas impinging upon mental illness and mental health there is a need for programs which would coordinate data on all of the social, emotional and behavioral problems in a community. Thus, to accomplish this purpose and to provide the administrators of mental hospital and outpatient clinic programs a perspective within which they can evaluate their own programs, reporting is needed in defined geographic areas from such sources as private psychiatrists, social agencies, juvenile courts, facilities for alcoholics, nursing homes, chronic disease hospitals and homes for the aged.

The Branch has been working with the states to improve reporting within public mental hospitals and outpatient psychiatric clinics. Two new states were added to the Model Reporting Area bringing the total number of member states to 22*. The hospitals in these states account for 206 of the 279 state and county mental hospitals of the nation and provide care for 410,000 or 75% of the patients in all state and county mental hospitals on any one day. Participation by psychiatric clinics in national reporting has continued to improve. Approximately 1,000 of the 1,400 clinics now report information on patient services. For the first time reports are being received from the clinics in New York State and the Veterans Administration. However, the job of coverage and standardization of reporting is far from complete and we plan to continue our work with states to improve hospital and clinic reporting and to develop methods that will reflect changes resulting from new treatment programs and concepts. The activities of the Model Reporting Area have stimulated the further development of regional groups of mental health statisticians with the continuation of annual meetings of a Midwest group and the formation of a Southern group.

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Arkansas	Louisiana	Oklahoma	Wisconsin
California	Michigan	Pennsylvania	
Connecticut	Minnesota	South Carolina	
Illinois	Nebraska	Tennessee	
Indiana	New Jersey	Texas	
Kansas	New York	Virginia	
Kentucky	Ohio	Washington	

The services of the Section on Theoretical Statistics and Mathematics continue to be in increasing demand by the investigators in the basic laboratory and clinical research programs of the National Institute of Mental Health. This section has carried out its own research activities developing several new techniques in multivariate analysis which are helpful in the analysis of profile data and in the analysis of variation. During the past year the section has continued to provide liaison services between investigators in the laboratories and branches of the Institute who collected large bodies of data and the machine programmers of the electronic computer which had become available at NIH in the early part of the year.

A problem that makes the achievement of results in the biometrics field slow is the shortage of well-qualified personnel to fill positions both in the National Institute of Mental Health and in the field. Not all states have bureaus of statistical research within state departments of mental hospitals and mental health, and only a few of the states with these departments have well-trained people. To improve this situation at least three things are needed. First, directors of state mental hospital and health programs must be willing to give strong support to the development of adequate statistical research programs. Second, they must be willing to pay salaries at a sufficiently high level to attract well-trained and imaginative people into the field. Third, steps must be taken to increase the pool of trained analytic and mathematical statisticians to fill the increasing need for such personnel in action and research programs in the mental health field. The members of the Branch are constantly urging promising individuals in the statistical offices of the various state mental health programs to take advantage of the opportunities now available for advanced training in biostatistics and epidemiology resulting from the grant programs developed by the NIH to support training of biometricians in the various schools of public health and universities throughout the Nation.

The reports of the individual sections follow:

HOSPITAL STUDIES SECTION

During the year the Hospital Studies Section continued its work in further developing the Model Reporting Area for Mental Hospital Statistics, carrying out cooperative studies with individual hospitals and state mental hospital systems on methodology of cohort studies and on the development of studies designed to assess the role of the hospital in the care of patients and worked with the Outpatient Studies Section in the development of plans for a study which would relate the socioeconomic characteristics of persons admitted to psychiatric facilities to corresponding characteristics of the general population.

Ninth Annual Conference of Mental Hospital Statisticians. The Model Reporting Area for Mental Hospital Statistics held its Ninth Annual Meeting in Albany, New York, in May 1959. The acceptance of South Carolina into the Area brought the total number of member states to 21. The Conference discussed the use of revised terms to define the movement of mental hospital patients and a set of schedules, based on these revised definitions, was proposed for the annual reporting of data to the Biometrics Branch. Plans for an interstate cohort study of mental hospital admissions were formulated with the proposal that a prospective study be conducted beginning with patients admitted July 1, 1959. Specific definitions and rules regarding the mechanics of the study were discussed and approved by the Conference members. Representatives from four member States described the community mental health programs operating in their respective states. There was general agreement that these programs have done much to stimulate local interest in mental health but that more data are needed on various aspects of these programs in order to adequately evaluate them. Renewed emphasis was given to the need for new techniques of reporting mental hospital expenditure data in order to insure comparability from state to state. The Conference also heard a report on the progress of the proposed 1960 study of socioeconomic characteristics of admissions to psychiatric facilities, recognized the need for a more adequate classification of mental hospital personnel, and discussed a tool by which the effectiveness of mental hospital programs could be evaluated.

Cohort Studies. A report of the first cooperative study conducted by the Model Reporting Area was published in November 1959. In this study, groups of first admissions with specified characteristics were followed during the first 12 months of hospitalization to determine their probabilities of release, retention, and death. A large section of the monograph was devoted to a discussion of pitfalls and difficulties inherent in the comparison of these and other hospital data among the 11 states.

The study generated considerable interest among the Model Reporting Area states in conducting another cooperative cohort study. However, the new study will attempt to eliminate many of the pitfalls of the first one by more precisely defining categories of patients and by using a longer followup period. The study will not only obtain probabilities of first release and death, but also estimates of the probability of return to the hospital within specified periods following first release among cohorts of released patients. Almost all of the Model Reporting Area states indicated their interest in participating.

The Biometrics Branch has continued to work with the Warren State Hospital, Warren, Pennsylvania. Data are being obtained that will make it possible to analyze the experience of cohorts of first admissions to this hospital during the period 1916-58, not only by age, sex, and diagnosis but also by such variables as urban-rural residence, occupation, marital status, therapies, etc., and to determine readmission rates to the hospital after specified periods of time following release by these variables. Problems in coding have been worked out and the data are now being processed for tabulation. Data on admissions during the years 1948-52 were used as preliminary study, the purpose of which is to develop efficient data processing procedures using a relatively small number of cases. Also, since these years are centered around the 1950 Census of Population, patients' admission characteristics can be related to the characteristics in the general population. For example, preliminary findings reveal some striking geographical variation in admission rates with respect to both distance and direction from the hospital. More detailed analyses of admission patterns, therapy and movement of patients will be carried out jointly with hospital personnel.

Mortality Studies. Tabulation of the number of deaths occurring in public mental hospitals in 1955 by age, sex, mental disorder and cause of death were made available to the Biometrics Branch by 17 Model Reporting Area states. Age and cause specific rates, percent distribution of deaths by cause, and the ratio of hospital deaths and death rates to deaths and death rates in the general population were computed from these tabulations using the IBM 650 computer. Analysis of these data revealed considerable differences in hospital death rates among states for certain causes of death. Further investigation indicated that some of this difference might be attributed to the fact that coding of cause of death had been done by the hospitals in some states and by the vital statistics office of the state health department in other states. An analysis is now being carried out to determine the effect of cause of death coding on interstate differences in hospital death rates. The distribution of causes of death in states where causes were coded by the hospital are considerably different, in some instances, from those in states where trained coders are used. Several states have prepared

tabulations of the same deaths coded by each of these two sources. This will permit the development of correction factors which would, to a large extent, eliminate interstate differences in cause of death distributions due to coding.

Socioeconomic Study. Plans for the proposed study of the demographic, socioeconomic and family characteristics of patients admitted to psychiatric facilities in 1960 have been developed further. This study, to be done in conjunction with the Outpatient Clinic Section, has as its primary objective, the determination of the extent to which various socioeconomic groups utilize the different psychiatric facilities within a state. In order to attain this objective it is necessary to have basic socioeconomic data on the patient and members of his family which can be related to similar data obtained for the general population in the 1960 U. S. Census.

Data for patients and their families can be obtained either from an interview of the patient upon his admission to a facility or from the U. S. Bureau of the Census which would extract the data from the census schedules for those individuals who were admitted to psychiatric facilities after the 1960 census. Both methods are being tested to determine which is the most feasible approach. It is anticipated that a survey of a sample of these patients will be required as a validity check. A pilot study has been conducted in the state of Maryland to test the feasibility of obtaining the information directly from the patient or his family. Another pilot study is now underway in North Carolina to determine what problems would result if a list of names of admissions to psychiatric facilities were given to the Bureau of the Census which in turn would attempt to find matching census schedules for these individuals. This will be based on a trial census which the Bureau of the Census conducted in two counties in North Carolina in February 1959.

Several states have indicated their interest in participating in this study. The extent of their participation will depend a great deal upon the method used to obtain patient data, the reporting resources available in the state, and the availability of personnel and funds needed to conduct the study.

Study of Mental Hospital Costs. In February 1959 the Biometrics Branch called together a committee of mental hospital fiscal people and statisticians to discuss the development of uniform national reporting of mental hospital costs. Because of the inadequacy and lack of uniformity of data currently collected on mental hospital costs, there has been an increasing demand for improvement in this area. The committee recommended the development of a classification of the total amount spent per year by a state mental hospital system according to each of two axes--object and function. The classification by object would

include personal services, food, utilities, medical and hospital supplies, clothing, household supplies, communications, travel and subsistence, new equipment, repairs to plant, farm supplies, office supplies, miscellaneous supplies and patient services in a community. The classification by function would include inpatient care, outpatient care, research, training and central office. The committee agreed that a cross-tabulation of these two classifications for each state would provide more useful data than are now available. However, it was recognized that each of the categories requires careful definition. Since this would require a considerable amount of research it was agreed that the task could not be accomplished by the committee. Responsibility for the project has since been assumed by the National Association of State Mental Health Program Directors with representatives of the Biometrics Branch serving as consultants. This group is completing an application for a grant and hopes to initiate the project within the next few months.

Regional Meetings. The Fifth Midwest Conference on Mental Health Statistics was held in St. Paul, Minnesota in October 1959. These meetings are an outgrowth of the annual meetings of the Model Reporting Area and are quite helpful to representatives of midwestern states who are not members of the Model Reporting Area. The primary focus of this meeting was on the development of a cooperative interstate study on aged mental patients. Plans have already been formulated for a detailed study of factors affecting the admission of aged patients to the state mental hospitals and of possible alternatives to such hospitalization. Three states are interested in carrying out this study cooperatively. The entire group of 11 states is interested in conducting a study on the movement of aged patients after admission to the hospital in relation to certain demographic and socioeconomic characteristics. Plans have been made to formulate a design for this study, with the assistance of the Biometrics Branch.

The directors of mental health programs in the 16 states served by the Southern Regional Education Board have expressed interest in developing methods of evaluating their programs. They have agreed that as a first step, fulfilling the requirements for membership in the Model Reporting Area is essential. Therefore, the Southern Regional Education Board has sponsored a meeting in which persons responsible for statistical reporting in these mental health programs were represented. A committee appointed by this group has met subsequently and has formulated a set of basic objectives of an organization of mental health statisticians in the southern region and has developed an agenda for the first meeting of this group to be held in January 1960. Eight of the states in this region are now members of the Model Reporting Area and membership of the other eight states in the Area is one of the major objectives of the group. The primary emphasis of the first meeting will be a discussion

of the ways and means of assisting these other eight states in developing their statistical programs to the point at which they would qualify for membership in the Model Reporting Area. The Biometrics Branch has worked closely with this group in the development of this program.

The work of these two groups has stimulated the discussion of the development of a third such group--that served by the Western Interstate Commission for Higher Education. A meeting has been planned tentatively for 1960 at which the 13 states in the western region would be represented and would discuss mutual problems in statistical reporting and analysis of mental health data. The Biometrics Branch has been asked to provide advice and consultation to this group. Thus, with the development of statistical programs in these two regions within the next few years, over 40 states would be able to report mental hospital data in a uniform way.

CONSULTATION SECTION

The Consultation Section continued to implement its objectives which are, mainly, to establish efficient record systems, to promote use of comparable terminology and definitions, and to facilitate data reporting and data analyses by providing consultative services in the setting up of record and report systems or reorganization of outmoded and cumbersome record systems. The Section's capacity to provide such services was enhanced when it hired a registered Medical Record Librarian.

By furnishing advice and assistance in research design, data collection and analyses the Section aids not only in procuring much needed information but stimulates other states to engage in research by providing working models, methodological techniques and resources.

The following states or agencies requested and received consultative services regarding improvement of their central office, mental hospital or outpatient psychiatric clinic record systems or on matters regarding research design, program evaluation and data analyses: Connecticut, Georgia, Maryland, Maine, Massachusetts, Missouri, New York, North Carolina, Ohio, and South Dakota.

Connecticut. The Superintendent of the Connecticut State Hospital at Middletown wished to have his recordkeeping system reviewed and recommendations for its reorganization provided. The Connecticut State Department of Mental Hygiene asked the Biometrics Branch to provide this consultation. The Section, after reviewing the recordkeeping system, furnished written recommendations with regard to its reorganization and is assisting in its implementation.

Georgia. Consultation was provided to the Director of Division of Mental Health of the Georgia Department of Public Health with regard to an evaluation of their program which provides for care in general hospitals with psychiatric facilities in order to prevent hospitalization in the state mental hospital. Revisions in the data schedules and coding schemes were readily accepted.

The clinic reporting program was reviewed, definitions explained, and uses of the data specified.

Maryland. Consultation to the Maryland Department of Mental Health has been provided on many aspects of its program. The Superintendent of the State Mental Hospital at Crownsville has asked and is receiving consultation with regard to his medical record department. Officials of Maryland Department of Mental Hygiene asked to receive consultation with regard to setting up a hospital record system at the newly opened Maximum Security Mental Hospital at Jessup. Several meetings have been held with the Director of Statistics of the Maryland Department of

Mental Hygiene with regard to the setting up of a register of all persons hospitalized for mental illness. In connection with the register the Chief of the Consultation Section met with the Director of the Statistics of the Maryland Department of Mental Hygiene and officials of the Veterans Administration hospital at Perry Point in order to have this Veterans Administration hospital send to the Maryland Department of Mental Hygiene reports on all persons hospitalized at Perry Point for mental illness. The Director of the Veterans Administration at Perry Point has agreed to submit such data.

Maine. The Director of the Division of Alcoholic Rehabilitation of the Maine Department of Health and Welfare requested consultation with regard to revising their recordkeeping system so as to more readily be able to evaluate their activities.

Massachusetts. The Chief of the Section supervised a contract study being done by Harvard School of Public Health for the Biometrics Branch. This study will determine probabilities of release and return using two different points in time (significant release or return and standard release or return) for cohorts of admission in the years 1900, 1940 and 1950. The followup period is limited to five years after admission and will consider such variables as age, sex, mental diagnosis, education, marital status, etc. The results of this study are now being prepared for publication.

Missouri. In conjunction with staff from Community Services Branch and personnel from the VI Regional Office consultation was provided the professional staff of the Kansas City Mental Health Foundation, Psychiatric Receiving Center with regard to the evaluation of their various service programs. One outcome of this meeting was that the Executive Director of the Psychiatric Receiving Center asked for and is receiving consultation from the Medical Record Librarian with regard to reorganization of his current recordkeeping system.

New York. The Section participated in a series of discussions with the staff of the Milbank Memorial Fund, the New York State Department of Mental Hygiene and the staff of Hudson River State Hospital with regard to a proposed program at Hudson River State Hospital which can best be summed up as the open-door system. Implementation of this program and its proposed evaluation is waiting the hiring of an assistant director to head the program.

Consultation was given the Director of Research and Statistics of the New York State Department of Mental Hygiene with regard to the qualifications and uses of medical record librarians in the Central Office and in the State mental hospital system.

Consultative services for setting up a statistical recording system was provided the Psychiatric Division of Bellevue Hospital.

North Carolina. The recordkeeping system at Goldsboro Training School was reviewed and recommendations for its reorganization made.

Ohio. At the request of the Chief, Medical Services Section, Department of Mental Hygiene and Correction in Ohio the medical record librarian reviewed the medical record systems in some of the state mental hospitals and discussed position descriptions for medical record librarians in these hospitals with him. The Chief of the Consultation Section discussed with him the processes by which data can be collected regarding non-psychiatric illnesses among mental patients hospitalized in hospitals of the Department of Mental Hygiene and how to evaluate the care and treatment received by such patients.

The Section is utilizing the record system of the Ohio Department of Mental Hygiene and Corrections. Data on first admissions during the years 1948-1952 are being correlated with pertinent 1950 census information and enabling the computation of admission rates by such factors as age, sex, color, marital status, education, occupation, residence, mental diagnosis, etc. Proximity to state mental hospital facilities and the effect of other mental hospital facilities on admissions to state operated hospitals is also being considered. Last year a paper with regard to those patients with schizophrenic reactions was published in the proceedings of the 10th Regional Research Report of the American Psychiatric Association. This year a report with regard to mental diseases of the senium was presented at the American Public Health Conference held in Atlantic City, New Jersey. The paper has been submitted for publication in the Journal of the American Public Health Association. A paper reporting on alcoholic psychoses in Ohio has been submitted to the Quarterly Journal of Studies on Alcohol. A report involving immigration and insanity has been submitted and accepted by Public Health Reports. Tabulations with regard to discharges and deaths among these admissions have been prepared and the analysis and report will be forthcoming next year.

South Dakota. Conferred with directors and representatives of several mental health centers in South Dakota regarding the concept, purpose, and use of statistics in program planning. A representative of the VI Regional Office was present at this state-wide meeting.

Miscellaneous. Chief of the Section serves as the Statistical Consultant to the Hospital Consultant Services of the Community Services Branch. Demographic data with regard to the state of North Dakota was submitted to them in preparation for its forthcoming review of the mental health program in North Dakota.

The Chief of the Section acts as Statistical Consultant to the Director of the U. S. Public Health Demonstrations Center at New York City. Among other things, this Demonstration Center is following up persons discharged from Lexington Hospital in Kentucky with the purpose of determining relapse rates and reasons therefor.

He is supervising a contract study being done by the Baltimore City Health Department. This study will determine the specificity and sensitivity of school teachers in regard to their employment as case finders of children who may be considered emotionally maladjusted. The contract went into effect October 1, 1959 and will terminate September 30, 1960.

He participated in the Fifth Midwest Conference on Mental Health Statistics and the Ninth Annual Meeting of Mental Hospital Statisticians. These meetings are more fully described in the Hospital Studies Section.

He served as resource person at a research conference on rehabilitation in the management of mental disorders held at the New York State Psychiatric Institute.

He has conferred with the Program Director of the National Organization for Mentally Ill Children, Inc. with regard to the data the Branch collects which would be useful to them and the feasibility of widening the reporting program where such data is not readily available.

OUTPATIENT STUDIES SECTION

The Outpatient Studies Section continued to work on extending the annual statistical reporting program to additional clinics, on increasing the uniformity in interpretation of items and definitions by all clinics, on the preparation of analyses for publications, and on developing suggested revisions in the reports to more adequately reflect the characteristics and activities of the clinics and to provide more meaningful data about patients. The development of special studies to better understand the clinic population and the services they receive also has progressed during the year. The Section has initiated and developed plans for coordinated research on individuals under care of all outpatient and inpatient psychiatric facilities in one state. The Section has also worked with several community groups attempting to collect data on mentally ill persons known to non-psychiatric resources.

Annual Statistical Reporting Progress. Clinic participation in the annual statistical reporting program has increased steadily since 1954-55 when the program was initiated. In that first year most of the 1,200 clinics in the United States reported information on clinic characteristics and staff and man-hours, but only 404 clinics reported data on characteristics of patients and the services they received. Special efforts to develop procedures for State tabulation of clinic data on patients has resulted in a gradual year-to-year increase in the number of clinics reporting these data. Present information indicated that for 1959, these data will be reported for as many as 1,000 of the approximately 1,400 clinics. Reports have been received for the first time on patients in New York and Veterans Administration clinics. These reports as well as reports for additional clinics in a number of previously reporting states accounted for an above average yearly increase for the fiscal year 1959.

Continuing effort has been directed toward helping states develop complete and accurate reporting and uniform interpretation of definitions, and toward increased clinic participation in the voluntary nationwide reporting program. Problems were discussed with state, regional office, and clinic staff, through meetings and correspondence. Continued review of reporting and the special field trial in Maryland, described in detail below, has suggested a need for some revision in a number of the items, definitions, and instructions. Notes on problem areas are being assembled for a reevaluation of reporting and possible revision through national committee meetings that may be held next year. Plans for a region by region field review of problems in reporting have been initiated, with the possibility that more comprehensive field statistical supervision of reporting can be established.

Clinic Directory, 1959. Following special publicity sent to all states on the use of 1959 data for a new clinic directory, reports on clinic characteristics have been submitted by nearly all of the 1,400 clinics in the United States. The National Association for Mental Health, Inc. is using duplicate copies of the reports to prepare the 1959 directory of outpatient psychiatric clinics similar to the one prepared for 1954-55. A special detailed and comprehensive review of all clinic reports has been necessary to insure accurate and complete reporting of the directory information.

Analysis of Patient Services of Clinics. Based on reports for almost 500 clinics for the fiscal year 1956, a first national analysis of data on characteristics of clinic patients and the services they received was completed for publication in the November 1959 issue of Public Health Reports. Data reported by the clinics made possible estimates of total patients, by sex and age groups, on the rolls of outpatient psychiatric clinics during the year and an age comparison of outpatient and inpatient population. The preliminary findings were outlined in the Section's previous annual report. Much of the data in this first national analysis and some information from the Monograph on Characteristics and Professional Staff of Outpatient Psychiatric Clinics is being used by the Joint Commission on Mental Illness and Health in their publications on psychiatric resources and the treatment of mental patients in the United States. The authors have made extended use of these materials indicating "they are the only ones available in our country now."

Following the development of standard codes for use nationally, uniform punch cards were submitted by 463 clinics in 34 states for about 80,000 patients with clinic services terminated during the fiscal year 1957. A number of tabulations of these punch cards have been prepared for study and analysis. In addition to providing more detailed information on age and diagnosis of clinic patients than was available for the 1956 analysis based on clinic summary reports, these tabulations provide information on color, referral source, and disposition at termination. The tabulations will permit the study of the interrelation of these patient characteristics and services received. Preliminary summaries on diagnosis related to other patient characteristics have been prepared for the Community Services Branch for use in special studies on juvenile delinquency and alcoholism.

Plans for the collection of socioeconomic information about the families of patients and the patient himself originally designed for patients admitted to outpatient psychiatric clinics in a number of states has been expended to cover admissions to mental hospitals and other psychiatric inpatient facilities as well, while the geographic

area has been narrowed to selected states only. Progress on the most recent plans for the study are described in the annual report for the Hospital Studies Section.

Analysis of Community Services of Clinics. A first draft of a brief summary of the data reported on the community service activities of the outpatient psychiatric clinics was completed. The report, based on the activities reported for April 1958 by 595, or 47 percent of the 1,266 clinics in the United States, shows that these clinics devote on the average a relatively small proportion of their total professional staff time to this aspect of clinic service. Three-fourths of the 595 clinics spent less than 10 percent of their scheduled man-hours in this service, and overall it was about 6 percent. Consultation with and in-service training programs for other professional staff to help supplement their skills in handling problems of individuals accounted for two-thirds of all staff hours in community services. Information and educational services to the general public accounted for another 30 percent, and participation in community planning and coordinating work the remaining 15 percent. Marked seasonal variation in community service activities with peaks in the spring and fall months and little activity during the summer is evident from special reports submitted by 101 clinics on the amount of such activity during each of 12 months during 1956.

Methodological Studies in Maryland. Research on patient characteristics and services in out-patient psychiatric clinics in Maryland was initiated during 1958 as another special project undertaken to understand needs and progress in the area of dealing with the major health problem of mental illness. This project was developed to answer searching questions on the kinds of people being seen, the services they receive, reasons for termination, and recommendations made at termination. The work in Maryland has concentrated on developing and testing new classifications and definitions for reporting to develop improvements where possible; on total participation in the reporting program so that admission and termination rates can be obtained; on comparing patients on admission with those under care and those terminated during the year to test bias that may be introduced in the use nationally of data on characteristics of terminated patients to describe clinic patients; on testing the extent to which a patient count for all clinics represents a duplicate count of individuals being served by clinics in an area; and on the development and application of other statistical methods in the analysis of data in the clinic area.

Diagnostic information has been lacking on 22 percent of the patients terminated from outpatient psychiatric clinics nationally. Various methods were tested in Maryland to reduce the proportion of patients reported without a psychiatric description. As a result of

these methods only 2 percent of the Maryland patients have been reported with "psychiatric disorder not stated." Progress has also been made toward solution of problems related to (1) reporting, as separate patients, mentally-ill parents seen in child guidance clinics on behalf of their child; (2) defining the time period when services should be classified as terminated; (3) obtaining statistics on the symptom of alcoholism independent of the psychiatric classification. The first age specific diagnostic termination rates in the clinic area and the first cohort analysis on the probability of being removed from the clinic rolls or receiving a final interview within specified intervals after admission, are being prepared. A comprehensive analysis is now underway and should be completed by the spring of 1960.

Coordinated Research File on Psychiatric Patients in Maryland.

Special plans were initiated in the Maryland project also to collate information on patients in hospitals and clinics in order to develop a register of all patients receiving either outpatient or inpatient care or both. The register will answer such questions as: What is the unduplicated count of individuals by age, sex, color, and diagnosis who are admitted to, terminated from, or under the care of a psychiatric facility within the year? What proportion of individuals diagnosed for the first time in a psychiatric clinic, are subsequently admitted to a psychiatric hospital within specified years after clinic discharge? What is the subsequent psychiatric history of an individual following first significant release from a mental hospital? Is the number and composition of the psychiatric population seen in psychiatric facilities fairly constant from year to year, or are there substantial yearly increments and decrements?

Detailed plans have been prepared by this Section for the organization of this coordinated research file, the kind of information it will contain, the flow of data to the central file, procedures for adding information, and for clearance of files. Plans are underway to initiate this coordinated research on psychiatric patients in Maryland before the end of 1959 and to establish an interagency committee to guide the research.

A presentation on the progress being made in Maryland in the development of an effective statistical system for mental illness was presented by the Chief of the Section at the Maryland Public Health Association meeting in October 1959. The paper has been accepted for publication in the American Journal of Psychiatry.

Non-psychiatric Facility Studies. The Section has advised several groups surveying the mental health resources and needs of their community, including the reporting of persons considered to be mentally ill by social agencies, school teachers, physicians, etc. The Section plans further intensive methodological experimentation in selected communities to develop ways to collect data on mentally ill patients seen by non-psychiatric resources.

SECTION ON THEORETICAL STATISTICS AND MATHEMATICS

During the year the Section has continued to assist and consult with investigators on statistical, mathematical, and biometrical problems arising in various investigations carried out by the laboratory and clinical sciences at National Institute of Mental Health as well as by scientists who are working in mental health problems outside NIMH. These services provide the scientists with the most efficient and valid statistical techniques available in the design and analysis of data. The Section has been consulted on a large variety of subjects including experiments on the effects of various drugs on psychiatric and sociological functions in animals and in man; studies in reaction time; brain lesions studies in monkeys, utilizing the continuous performance test; surveys on interactive patterns among socio-economic groups and among the emotionally disturbed; ecological and biological studies in Schizophrenia.

The Section has published the development of new techniques in mathematical statistics, especially in multivariate analysis which are helpful in the analysis of profiles and, in general, multiple observations on an individual. The Section is in the process of extending these developments from parametric to non-parametric techniques. The Section has also developed a Latin Square repeated measurement designs and their analysis which prove useful for Human and Animal Experimentation in a variety of disciplines.

During the past year the Section has continued to provide liaison services between investigators in the laboratories and branches of the Institute who collected large bodies of data and the machine programmers of the electronic computer. The Section has initiated investigations in mathematical biology because of the significance of such research in various aspects of the field of mental health.

In addition to providing a variety of statistical and mathematical services to research and clinical investigators of NIMH, this Section has also been called into consultation by investigators outside NIMH. These services included consultations with various scientists at or outside NIH on the design of experiments, the analysis of data, the planning of sample surveys, mathematical models underlying data, and on statistical and probability theory. Members of the Section have given seminars at several universities on statistical methodology.

Advice has been provided to various committees with regard to grants, surveys, and proposals in the field of mental health. A member of the section has been appointed to a panel serving as a Study Section for Accident Prevention. Members of the section have also reviewed manuscripts arising within the Institute and have served as referees on papers submitted for publication in statistical journals.

Some examples of the investigations in which this Section has participated by providing consultations in design and analysis of data are:

1. Experiments on the effects of various drugs on psychological functions in animals and man.
2. Reaction time studies in regard to audio and visual phenomena.
3. Brain lesions studies in monkeys.
4. Studies correlating oxygen consumption and other cerebral blood flow measurements with psychological and psychiatric variables in man.
5. Bio-assays of lethal drugs in animals.
6. Studies in maternal attitude tests.
7. Ecological investigations in animals.
8. Experiments on the effects of tranquilizing drugs, barbiturates, sedatives, narcotics, and hypnotics on psychological and physiological functions in animals and man.
9. An investigation into the relations between certain electroencephalographic variables and other physiological and psychological attributes.
10. Studies into the diagnosis of zygosis and other related human genetic investigations.
11. Precision of Amino Acid Determinations.
12. Probability models in Polymer Chemistry.
13. Studies in Adult Psychiatry.
14. Studies in transport mechanisms.
15. Mathematical model of Psychoanalysis.

OFFICE OF THE CHIEF OF THE BRANCH

During the year a professional member of the Office of the Chief of the Branch continued to provide liaison between the Clinical Neuropharmacology Research Center, the Juvenile Court of Washington, D. C. and the Health Insurance Plan of Greater New York. The services provided were as follows:

1. The Clinical Neuropharmacology Research Center. Work has been done on the development of instruments for the evaluation of patient change, on determining their reliability and applicability to the patient population under study. Methods for characterizing the patient population have been developed so that it is now possible to judge the suitability of groups of patients for participation in various studies being planned by the staff. Some of these methods are being evaluated and modified to meet current research interests. Consultation was provided to various scientists in the Center in study design and analysis.

2. The Juvenile Court, D.C. Work continued on the development of a statistical system which will make it possible to analyze the operation of the court and to examine the nature of the varied situations with which it deals. Definitions were established for a case in the court, a referral, a disposition, etc. and agreement was reached on the demographic, social and legal variables which should be included in the routine reporting system. An arrangement was worked out whereby the Childrens Bureau of the Department of Health, Education, and Welfare, will advise the Juvenile Court on the details of statistical reporting.

3. Health Insurance Plan of Greater New York. Discussions were held with officials of the Health Insurance Plan to explore the possibility of using the records of their insured population to determine the frequency with which psychiatric diagnosis are placed on patients by family physicians and the various specialists, including psychiatrists. The utilization of services by persons with psychiatric diagnoses will be compared with that of an appropriate control group.

During the year the Chief of the Branch engaged in certain activities that might be noted.

He was invited to participate in a postgraduate program on "A Pharmacologic Approach to the Study of the Mind" at the Department of Pharmacology, University of California Medical Center and to participate in seminars on methodological and statistical problems in mental health at the School of Public Health, University of California. He continued to provide liaison between the National Institute of Mental Health and the Epidemiologic Intelligence Service Training Program at the Communicable Disease Center in Atlanta, Georgia.

He was a member of the Organizing Committee of the Work Conference on Epidemiology of Mental Disorders sponsored by the American Psychopathological Association and participated in by leaders in the field from this country and several European countries.

He was assigned as consultant to the World Health Organization to conduct preliminary epidemiologic surveys in Southeast Asian and the Far East in connection with the World Health Organization's proposed program for research on the epidemiology of mental disorders in different parts of the world in 1960.

The Chief of the Branch continued to provide liaison between a special grant being carried out at the Pacific State Hospital at Pomona, California for the NIMH. This project includes both an extensive research program investigating individual, familial, and community factors related to admission to and release from the institution, and evaluating the effect of specific treatment and rehabilitation programs within the hospital on the prevention of disability and the training of patients for community employment. In addition, this project is being used as a training center to attract into the field of mental retardation high caliber research personnel in psychology, psychiatry, biometry, sociology, and epidemiology.

The Chief of the Branch was honored during the past year by being elected to the Governing Council of the American Public Health Association and to the Governing Council of the Mental Health Section of the American Public Health Association. He was also elected to fellowship in the American Statistical Association in recognition of his work in the application of statistical methods to the field of mental health.

A list of publications of the Branch follows.

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2. Bahn, Anita K. The development of an Effective Statistical System in Mental Illness. Presented at the Maryland Public Health Association meeting October 9, 1959. Accepted for publication in the American Journal of Psychiatry.
3. Geisser, Seymour, A Method of Testing Treatment Effects in the Presence of Learning. Reprinted from Biometrics, The Biometric Society, Volume 15, No. 3, September 1959.
4. Greenhouse, S. W., and Geisser, Seymour, On Methods in the Analysis of Profile Data. Reprinted from Psychometrika, Vol. 24, No. 2, The Psychometric Society, June 1959.
5. Hospital Studies Section, Mental Health Statistics, Current Reports: Provisional Data on Patients in Public Hospitals for the Care of the Mentally Ill, 1957 and 1958, Series MHB-H-3, December 1958.
6. Hospital Studies Section, Model Reporting Area for Mental Hospital Statistics - Development, Purpose, Program, Public Health Service Publication No. 699.
7. Hospital Studies Section, Patients in Mental Institutions, 1956, Parts I - IV, PHS Publication No. 632, 1959.
8. Hospital Studies Section, Progress in Reporting Mental Hospital Statistics, Public Health Reports, Vol. 74, No. 10, pp 878-882, 1959.
9. Hrubec, Zdenek: The association of health and social problems in individuals and their families. Milbank Memorial Fund Quarterly, 37, 251-276, July 1959.
10. Kramer, Morton: Measurement of patient flow in institutions for the mentally retarded, American Journal of Mental Deficiency, 64, No. 2, 278-290, September 1959.
11. Kramer, Morton: What can be learned from routinely collected mental hospital data. For publication as part of a symposium on "A Pharmacologic Approach to the Study of the Mind" held by the University of California Medical Center, San Francisco, California, January 1959.

12. Kramer, Morton, and Greenhouse, S. W., Determination of Sample Size and Selection of Cases. Reprinted from Psychopharmacology: Problems in Evaluation, National Academy of Sciences - National Research Council, Publication 583, 1959.
13. Kramer, M., Pollack, E.S., and Redick, R. W., Studies of Incidence and Prevalence of Hospitalized Mental Disorders in the United States: Current Status and Future Goals. Presented at the Annual Meeting of the American Psychopathological Association, February 20, 1959. Accepted for publication in the Proceedings of the American Psychopathological Association.
14. Locke, B. Z., Kramer, M., Pasamanick, B. "Mental Diseases of the Senium at Mid-Century: First Admissions to Ohio State Public Mental Hospitals." Presented at the American Public Health Association Convention, October 20, 1959. Submitted for publication in the JAPHA.
15. Locke, B.Z., Kramer, M., Pasamanick, B. "Immigration and Insanity: First Admissions to State Mental Hospitals Among the Native-Born Population of Ohio at Mid-Century." Accepted by Public Health Reports for publication.
16. Locke, B.Z., Kramer, M., Pasamanick, B. "Mental Disorders Attributable to Alcoholism: First Admissions to Public Mental Hospitals in Ohio." Submitted to the Quarterly Journal of Studies on Alcohol.
17. Morrison, D.F., David, H.A., Life Distribution and Reliability of a System With Spare Components. Research on Order Statistics and the Design of Experiments, Technical Report No. 45, Department of Statistics and Statistical Laboratory, Virginia Polytechnic, 1959.
18. Patlak, Clifford, S., A Contribution to the Study of Diffusion of Neutral Particles Through Pores. Bulletin of Mathematical Biophysics, Volume 21, 1959.
19. Pollack, E. S., Person, P.H., Kramer, M. and Goldstein, H. Patterns of Retention, Release, and Death of First Admissions to State Mental Hospitals, Public Health Monograph No. 58, P.H.S. Publication No. 672, 1959.

Annual Report--1959
Clinical Investigations
National Institute of Mental Health

The inception of the Clinical Investigations program seven years ago afforded an unusual opportunity for the development of a mental health research unit. Eightybeds were made available, together with ample nursing, social service, and physical and recreational therapy support. Since the beds were in a Clinical Center rather than in a hospital, there were no service obligations, no teaching responsibilities. In fact, the beds did not even have to be devoted to patient care, but could be used for a variety of studies of normal individuals. There was similar freedom with respect to the recruitment of investigators. At a time when foundations were beginning to consider the merits of block versus project research grants, and when the idea of life-time appointments for a limited number of research professors was just being broached, we were able to select several life-time laboratory chiefs, a number of section chiefs, and to provide each of them with block support for long-range studies of broad scope.

In these circumstances it seems appropriate to scrutinize carefully the established psychiatric research organizations. Did the freedom from conventional teaching and service responsibilities and reasonable assurance of long-term support afford us an opportunity to study new problems or old problems in new ways? Should we endeavor to utilize these resources to establish a more or less traditional setting hopefully free, perhaps, from some of the common practical and material burdens which restrict freedom for research? Or should we to the best of our abilities try to develop a different type of setting and organization which might facilitate the production of data which could augment and extend the significance of the important studies being carried out in many excellent service and teaching hospitals?

It was felt that among the more important but least amply supported (by systematic observation) theories in psychiatry were those related to developmental and psychosocial determinants of personality formation and behavior. The great concentration of biological scientists at the National Institutes of Health promised powerful support for investigations of the organic bases of normal and abnormal behavior. At the same time the location of our facilities in a structure which was architecturally designed and administratively geared for an organic approach to chronic disease dictated against the

establishment of a community health facility with in- and out-patient, consultative, and home visit services, which might also have provided a unique setting for significant mental health studies. It was decided, then, to make the study of behavior rather than psychiatric treatment our central theme, and to study normal behavior as well as a selected variety of behavior disorders. This did not mean that treatment would be neglected; on the contrary, it was hoped to establish a highly effective therapeutic setting. The openness and freedom of expression which occur in successful therapy provides information about thoughts and feelings which cannot be gained by other means. The study of therapy brings to light some of the important forces which operate to change behavior patterns. This has obvious implications for education, and for any culture which would hope to bring about a fuller and more creative life for its members. Similarly, to the extent that mental illness can be looked upon as an experiment of nature, the study of the social, psychological, genetic, and biological variables which may appear in consistent patterns with different types of personalities and different types of disorder would provide the basis for a more powerful theory of behavior than is presently available. The establishment of longitudinal studies of child development would provide an ideal instrument for the verification of hypotheses derived from cross-sectional approaches, and would in turn feed back suggestions for scrutiny by the groups studying other phases of behavior. Finally, the opportunity of setting up a clinical neuropharmacology center in collaboration with Saint Elizabeths Hospital would significantly extend the scope of the experimental studies in which we could engage.

In keeping with this broad goal we did not limit our recruitment to the clinical therapeutic disciplines, but sought anthropologists, sociologists, and psychologists on the one hand, pharmacologists, physiologists and biochemists on the other.

The range of disciplines and the areas of study are roughly indicated in the table below:

	Pathological Behavior			Normal Behavior			Animal Behavior
	"Acting Out" Disorder	Disorders of Thought and Affect	Psycho- somatic Disorders	Adult	Aged	Child	
Anthropology							
Sociology							
Psychology							
Psychiatry							
Pharmacology							
Physiology							
Biochemistry							

Not all of these areas are being intensively studied at this time, nor is each discipline represented in each study. In their individual reports, the laboratory and branch chiefs have given substantive reviews of the work in progress. Before proceeding to them, I wish to point out some of the issues we have encountered in our efforts to give substance to this idea for a mental health research program.

The first problem faced was that of staff recruitment. For such a goal as has been outlined, it would have been desirable to have brought together laboratory chiefs representing at least several of the important disciplines, to have given them time to get acquainted with each other's concepts, to outline several investigative problems of mutual interest in addition to others they would pursue individually, and then to assemble the supporting staff. Even in this demi-paradise, however, time was a precious commodity. A commitment had already been given to open the first ward four and one-half months after the Director of Clinical Investigations was appointed, and by the end of the year a fifty bed unit was supposed to be in operation. Although this time schedule was not strictly enforced, it is not necessary to stretch one's imagination to picture some of the difficulties which were encountered. Both the investigative groups and the hospital organization were built up from scratch. Every appointment had to be made through the U. S. Public Health Service Commissioned Corps or through the Civil Service system. And when finally a staff was assembled, each member bringing with him the point of view and way of operating which were traditional at his previous assignment, we had to forge a new set of procedures which would be suitable for our goals, for our staff as a whole, and for our new setting.

Since it was not possible to recruit the laboratory chiefs and bring them together to plan our joint program before operations actually began, the directors of each of the major divisions were appointed as soon as the interest of a suitable individual could be enlisted. Each laboratory chief joined in the consideration of those who were appointed subsequently, which has made possible good personal as well as potentially good intellectual and working relationships. This, in my opinion, is relevant to the effectiveness of interdisciplinary research since I believe that some conceptualizations may require more than one mind, more than one way of looking at behavioral events. However, the result of this manner of program growth has been the development by each laboratory and branch chief first of his own individual program. It took five years to bring the group together, and now after seven years, I believe that it would be fair to say that each laboratory has defined its major research

goals; in each of them creditable investigations are well under way, and some significant studies have already been completed. In individual projects there has been considerable collaboration between laboratories, and in some of the laboratories several disciplines are strongly represented. In addition, there is a degree of overlapping of interest between laboratories in several important research areas, even though the approach and focus of each group varies. All this could serve to support a coalescence of interest in one or two problems of major theoretical importance which might constitute a limited portion of the program of each laboratory. While many factors favor the gradual formulation of several such broad research studies, it remains to be seen whether they are all that is necessary and sufficient for truly creative interdisciplinary work.

I believe that the first phase of the development of our research program is over. We are no longer laboring just to secure a firm footing, but can turn more of our attention to the circumstances under which we work. There are two sets of conditions which affect our creativity, our sense of satisfaction and fulfillment in our work, and, consequently, our productivity - one of these is external, the other internal.

The National Institutes of Health developed from the old U. S. Public Health Service Hygienic Laboratory, and the list of our forebears includes such distinguished names as Rosenau, Reid Hunt, Voegtlin, Stiles, Mansfield Clark, Goldberger, Francis, and, more recently, Korngold. Despite this excellent record, every senior investigator we have approached in our recruitment program has had serious questions about freedom of research in a government institution. Where public moneys are spent, controls of some sort are invariably instituted, questions are asked at frequent intervals, certain regulations are observed. Research workers traditionally believe that regulation should come from within themselves, and not be imposed by external authority. Personal contact is important to them, and they are concerned about working in an organization whose very size makes it necessary that some decisions affecting their work be made at levels several steps removed from them. Those of us who look upon our land as the cradle of liberty, cannot but feel some concern at the widespread belief among scientists that as liberty has become institutionalized scientific freedom has been so restricted or so precarious that some of them would not seriously consider a government appointment.

On the other hand, however, there were many who believed that the government has a responsibility to conduct basic research, and who were interested in becoming personally involved in the development of what they believed could become an excellent research institution. In my opinion we have made notable progress toward that goal. At the bench level, research problems can be selected by the investigators who will work on them. Unless new and additional space, equipment, and/or personnel are sought, the investigators have a high degree of control over the resources which will be employed in the attack upon the problem. As I see it, the most serious and difficult question which confronts us is that of program evaluation. This regularly comes up when promotions are considered and when proposals for expansion are presented. It becomes an issue when any request is made which calls for a break in routine and established procedures. It is generally accepted as desirable to have strong representation of related scientific disciplines in each of our major program areas. It is obvious to everyone that in the large population which recruited as a result of this decision, there must be variations in the competence and creativity of the research staff - some may approach genius, others of us may never be more than pedestrian. It is equally obvious that as the program expands and as the numbers of scientists increase, decision making can no longer be confined to the relatively small group who had the vision and who have borne the responsibility for the development of the National Institute of Health as they stand today. The government operates as a line organization, however, and line organizations make no provision for delegation of decision making responsibility. The man on top remains responsible. As program grows and numbers increase, he has less and less contact with the individual members of his staff. Administrative routines are established to deal with regularly recurring and commonly accepted procedures. But the break in routine calls for individual consideration and makes a demand upon the chief's limited time. He no longer is able to maintain his earlier personal involvement in each phase of the developing program. Therefore he sets up a number of intermediate persons or groups to review requests and to advise him concerning the appropriate decision. In fact, if the program grows large enough, he may even call upon outside groups to assure him that the proposed plan has been carefully considered and merits support. In this process what begins as a highly personalized research issue or problem or request becomes progressively depersonalized as it passes from level to level on its way through the decision making machinery. Such circumstances are obviously not conducive to creative effort, particularly when - as sometimes but not always happens - the effort may constitute an assault upon cherished

concepts. It is here that the problem of how creative the individual may be enters the picture. Most of us would grant an Einstein, a Fermie, or a Darwin any condition he deserves, but is equal freedom to be granted to the mine-run investigator? My answer to this question would be emphatically "Yes!" There is considerable evidence to support the belief that creativity is fostered by assigning the decision-making responsibility to the level at which all the immediately relevant facts are available. The development of the Assembly of Scientists is a step in this direction; the more the scientists as a group can share in the decision-making process, the more responsive will it be to their needs as productive investigators.

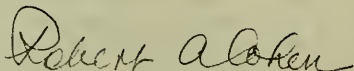
But the most important answers to the question of what is needed to do thoughtful research lie not in our stars but within ourselves. It has, perhaps, been more stressful than we realize to come to this new type of institution and to settle down immediately to the pursuit of new knowledge. If a group from Walla-Walla should be first to settle on the moon, those of us who arrived a year later might expect to find a number of institutions closely resembling those we know exist in Walla-Walla. In fact, the very names of New Orleans, New York, New Haven, and New London suggest that for ages past the thoughts of explorers turn toward the scenes of their childhood. Although it is true that research was fostered first by the learned societies, it soon found its home in the universities where, until recent years, it largely remained. Although universities were supported by lordly patrons, research could hardly be said to have lived a life of luxury. Traditionally, it was conducted in a garret, with simple, home-made equipment, at odd hours snatched from teaching and family responsibilities, and often drew its inspiration from the pressure of conflicting forces with which the teacher or doctor was wrestling in the course of his daily life. In some instances the researcher did not even have the blessing of a university position - Einstein worked in a patent office, Beaumont at an isolated Army post.

Probably such events as the successful development of the atomic bomb and Ehrlich's discovery of the effectiveness of 606 gave support to some of the thinking which led to the building of the Clinical Center. After all, if Einstein developed the theory of relativity in a patent office, what greater ideas might he have had if he had worked from the beginning in a large research institute? If Ehrlich had tested the therapeutic effectiveness of all 606 of his preparations simultaneously, might not millions of people have been spared the ravages of syphilis? If Shakespeare composed his poetry for a group of ragged players, what beautiful images might he not have brought forth if he had written from the comfort of an endowed chair?

Most of us came from universities and hospitals where we had to teach and had to treat patients. We had longed for an easing of these burdens, for time to pursue our ideas in leisurely and thoughtful fashion. But few of us ever dreamed that we would one day be given an institution not only with freedom from but an injunction against teaching and service, and told simply "create!" Research ideas come in unplanned-for places and at unplanned-for times, and not necessarily most often when one's professional life depends upon their appearance. It took an environment such as NIH which, despite its limitations, has, perhaps, the greatest degree of academic freedom to make us realize how truly protective teaching and service may be. When one earns his bread by these means, his research becomes a delightful avocation which can only serve to increase his self-esteem. Under such circumstances one dares to be unconventional, to let fancy roam - and perhaps it is no accident that basic research has flourished in universities more than it has in industrial laboratories, the occasional notable exception only serving to prove the rule. The fact is that NIH does resemble a foundation for industrial research in that our success is measured by a product alone, and not also by teaching and service as might be true in a university. Even though the product is basic research itself and not a better way to make lipstick, the concentration upon it and exclusive dedication to it might conceivably impede progress under certain circumstances. The atomic bomb and Ehrlich's final discovery of 606 were engineering feats. A basic research institute cannot be organized for that type of activity.

Whatever the correct interpretation may be, I have seen the new staff member, after his first breath of freedom begin to look around him for the chains he laid aside. Invitations to lecture are eagerly accepted. Some of us feel that we get our best ideas while teaching a group of eager, dedicated graduate students; others while we are wrestling with the responsibilities of treating desperately ill patients. We find ourselves longing for some of the university structure and atmosphere. Still others find themselves at times wanting more colleagues to work with them; somehow, in order to seem truly worth while, the program in which they engage should cover every conceivable facet of the research problem in question. I do not mean by this remark to cast doubt on the value of exhaustive attacks upon important problems, but simply to point out that on occasion we may have an impulse to assuage unwitting anxiety about the merit of a more or less limited problem by expanding its limits as if we were thereby increasing both its importance and its merit.

These, as I see them, are some of the important problems which face us in our effort to develop to its fullest extent the remarkable opportunity which is afforded us at NIH. For this new type of institution we shall have to build, as the universities did over a longer period of time, structures which permit and foster the highest degree of creative thought on the part of bench scientists and administrative leaders alike - structures not necessarily modelled precisely after those which have proved successful in universities, but which are fashioned out of the unique attributes of our own situation.

A handwritten signature in cursive script, reading "Robert A. Cohen". The signature is written in dark ink on a light-colored background.

Robert A. Cohen, M. D.
Director of Clinical Investigations
National Institute of Mental Health

Annual Report of the Chief of Clinical Care
William C. Jenkins, M.D.

In the course of the past year we have consolidated our clinical care activities into two services. The Adult Psychiatry Branch service has three nursing units providing the settings for the study of family relations in schizophrenia, for the study of first year college students who develop a psychiatric illness requiring hospitalization, and for psychosomatic studies with a group of normal control subjects. The Clinical Science Laboratory service, with two nursing units, uses one for a group of male chronic schizophrenic patients for the study of biological factors in schizophrenia, and the other is for a group of normal subjects who serve as controls for studies in that Laboratory. Each unit is administered with considerable autonomy, integrated with the total program of the respective clinical service involved, and the services coordinated within the framework of policy and practice for care of patients within the Clinical Center.

The Psychiatric Nursing Service has been organized along the same lines. Interchange of nursing staff personnel between the nursing units of a service has facilitated the development of greater understanding of the total research activities of the service, resulting in more interest and effectiveness in carrying out the work. The continued enlightened and devoted interest and support of Miss Agnes Middleton, Chief of the Psychiatric Nursing Service, and her staff, in meeting the many problems that arise in connection with the nursing care of the patients, has contributed immeasurably to the development of our Clinical Investigations program.

The clinical service of the Child Research Branch was discontinued June 30, 1959, with the termination of the clinical studies of that Branch. The clinical facilities used by the Child Research Branch were transferred, Nursing Unit 4-E to the Adult Psychiatry Branch, and Building T-4 to the Biosocial Growth Center, respectively.

The Biosocial Growth Center, administratively a unit of the Office of the Director of Clinical Investigations, NIMH, began operations July 1, 1959, under the direction of Dr. Wells Goodrich. This new program is designed to investigate the earliest influences on normal growth, through concurrent studies of parental attitudes in prospective parents with a group of newly married couples, parents of newborn, and parents of healthy two-year-old boys. At the same time studies of neonates are being carried out in collaborating hospitals, and of normal two-year-old boys in a nursery school setting in Building T-4. The research in Building T-4 is carried out as an out-patient operation through the Admission and Follow-Up Department of the Clinical Center.

In the past we have obtained the recommendation of the Medical Board and the approval of the Director of NIH for some of our psychological studies with normal subjects on an ad hoc basis. Recently the issue of the NIMH need to carry out certain psychological and sociological studies in which the usually required medical work-up is not indicated or is contraindicated, was more definitively recognized. The Director of NIH has approved the recommendation of the Medical Board providing for a policy change, requiring an amendment to the Organization and By-Laws of the Medical Staff of the Clinical Center, regarding psychological and sociological studies in Building T-4. This is a step in the direction of facilitating approval procedures for psychosocial studies of normal subjects.

On several of our units we have patients and normal subjects who remain here for long periods of time. It is therapeutically desirable to provide work opportunities for these people, consistent with their clinical status and the treatment goals for them. We have had some success in finding work for some of them but a wider range of such activity is needed. We are continuing our efforts to find a more favorable solution to this problem.

Adult Psychiatry Branch
David A. Hamburg, M.D., Chief

The Adult Psychiatry Branch has undergone major changes in the past two years. During 1958 there was extensive recruiting of new staff members, reorganization of existing projects, remodeling of space, obtaining of equipment, and generally tooling up for the new research that was being planned. In 1959 data collection got underway in several new lines of inquiry. Two tangible signs of change during the year were the opening of our two new research units in the hospital: (1) in January we began admitting patients to 3-East - college freshmen from a variety of eastern schools who encountered serious difficulty on going away to college; and (2) in June we admitted to 4-East our first group of healthy young volunteers for psychophysiological research. This latter unit makes possible a degree of close observation that has rarely been possible in psychosomatic studies. In addition, it permits utilization of environmental conditions for experimental purposes, and brings our various psychophysiological workers - necessarily an interdisciplinary group - into close contact with each other.

In our Psychosomatic Section we are attempting to determine the extent to which the day-to-day interactions of the human organism with its environment are reflected in endocrine function. Research in recent years has shown the extent of CNS regulation of endocrine function and hence a wide range of visceral functions. Our research is attempting to determine whether the emotional fluctuations of everyday living are associated with concomitant fluctuations in concentration of hormones that have wide-spread physiological significance. In this connection, we would like to quote from a chapter by our close collaborator, Dr. John Mason, in the 1959 Annual Review of Physiology.

"....It appears in general that the importance of central nervous system influences upon visceral functions, particularly endocrine regulation, has not been fully appreciated, probably for a number of reasons.

"In the first place, there has been the rather well-established general impression, supported by experimental data, that visceral functions are largely autonomous and responsive primarily to metabolic needs. The existence of these plausible concepts of self-regulation has possibly created resistance to the idea than an additional set of regulatory influences of considerable practical importance might be exerted upon visceral functions by the central nervous system.

"Probably a more important reason, however, has been the crucial matter of experimental approaches and methods. It is clear, first of all, that a comprehensive experimental approach to neural regulation of visceral function can only be achieved by the pooling of skills and viewpoints of a broad range of scientific disciplines. These combined approaches must permit, on the one hand, an analysis of central nervous system mechanisms (by the techniques of neuroanatomy, neurophysiology, neuropharmacology, neurochemistry, experimental and clinical psychology, and psychiatry) and, on the other hand, the analysis of specific visceral functions (by the techniques of chemistry, physiology, pathology, immunology, and internal medicine). Impetus for collaboration between various combinations of disciplines within these two general groups has come from both directions. Many behavioral scientists have come to view hopefully the measurements of visceral function, which are relatively objective and quantitative, as a major approach to the experimental analysis of emotional states, which have been extraordinarily difficult to evaluate by psychological techniques alone. Similarly, physiologists and internists have become increasingly aware of the necessity for a greater understanding of the impact of emotional disturbances upon bodily function and of the possible participation of emotional factors in the development of disease.

"Within the past five to ten years substantial new methodological developments have emerged in many fields and have made possible a new order of directness and accuracy in psychophysiological research."

One of the typical problems in research of this sort is the difficulty in utilizing the best available chemical methods for hormone measurement. Due to the active participation of Dr. Mason and his colleagues, we have had the benefit of microanalytic techniques that permit reliable detection of small differences.

Another typical problem in this kind of research consists in the difficulty of obtaining reliably observable emotional responses for experimental purposes. This is sometimes done by observing naturally occurring stressful situations and sometimes by experimentally devised situations. We believe that these approaches tend to complement each other and we are attempting to use both.

Research on human behavior and adrenocortical function in recent years has established the following points: (1) Plasma and urinary hydrocortisone elevations occur in circumstances of distress; this has been shown in several laboratories utilizing in aggregate several hundred human subjects. (2) There is a linear relation between the intensity of anxiety, anger, or depression and plasma hydrocortisone levels. (3) Particularly high hydrocortisone levels occur in the presence of disintegrative anxiety. This finding has recently been followed and confirmed in an ingenious experiment by Dr. Sheldon Korchin and associates. Dr. Korchin joined the Adult Psychiatry Branch as visiting scientist during the year. (4) Remarkably consistent hydrocortisone elevations occur in "first experience" situations - those characterized by a high degree of novelty and ambiguity.

We have been pursuing some of these findings during the past year - partly by way of additional checking, partly searching out further implications, partly inquiring whether epinephrine and norepinephrine are budged under these same circumstances.

In current studies, we are attempting to relate fluctuations in emotional state to fluctuations in plasma and urinary levels of hydrocortisone, epinephrine, and norepinephrine. We are utilizing three situations to observe change in emotional state: (1) adaptation to new environment; (2) spontaneously occurring events in the life of each subject; (3) standard commercial films that effectively present common human problems. In each of these situations, modest but clearly detectable shifts in emotional state can be observed, and evidence is rapidly accumulating that there is concomitant variation in levels of hydrocortisone, epinephrine, and norepinephrine. The fluctuations in emotional states are determined in several ways: (1) personal interviews; (2) ward observations; (3) self-rating questionnaires; (4) projective tests. In this work we have benefited from the collaboration of Dr. Joseph Handlon of the Laboratory of Psychology.

Adaptation to a new environment has proved to be a potent stimulus for adrenal activity. We have found substantial hormone elevations in normal controls during the first few days following admission to the Clinical Center. This is a high tension experience for most of these individuals, since they typically have only a vague image of the experiences they are about to undergo and are concerned about possible risks. Under these circumstances we have observed not only significant elevations in plasma and urinary hydrocortisone but also in the excretion of epinephrine and norepinephrine. The norepinephrine elevations are more consistent than the epinephrine elevations. This is in keeping with earlier findings suggesting that hydrocortisone and norepinephrine move closely together, while epinephrine shows a somewhat different pattern of response to environmental stresses.

Another point of interest has to do with differences in the diurnal pattern of hydrocortisone levels during the first few days after admission. Almost all individuals show significant early morning elevations in comparison with their basal levels. However, some individuals maintain relatively high levels throughout the course of the 24-hour period, while others show a sharp decline, sometimes having no detectable plasma steroids in afternoon and evening. The 24-hour urine, which is so extensively used in medical research, only reflects these differences in diurnal patterns to a modest degree. Thus, if one were relying on 24-hour urines alone, a good deal of this difference in regulatory pattern would be obscured. This may have methodological implications for other fields of medical research. At present, we are searching for possible behavioral correlates of the different neuroendocrine regulatory patterns.

Our data this year have shown that individuals are quite consistent in their adrenocortical responses. Some individuals consistently respond to the stresses of ordinary living with substantial steroid output; others show relatively slight response under the same circumstances. These differences tend to emerge more clearly under stress than under basal conditions. Thus, we observe patterns of adrenocortical function that are characteristic of individuals, and we are trying to correlate these with enduring patterns of behavior that are also characteristic of the individual. In the near future we hope to put our working hypotheses on this problem to a predictive test.

We are exploring various techniques for evoking emotional responses experimentally and measuring concomitant hormonal changes. Our main effort in this direction during 1959 has been the use of movies. In human stress research, it is essential to keep ethical considerations in mind when formulating experimental plans for evoking reliably observable emotional responses. Movies have the advantage of being clearly justifiable on ethical grounds. In addition, they permit generalization to the common experiences of everyday living; they do not represent an extreme or unusual psychological stress.

Our findings with the movie technique so far may be briefly summarized as follows: (1) moderate pre-film hydrocortisone elevations occur consistently, just as pre-experimental elevations have occurred in other contexts; these elevations are associated with a background of uncertainty and tension about the experiment; (2) against the background of this tension and moderate steroid elevation, sharply contrasting film effects have been demonstrated: pleasant, absorbing films consistently produce a drop in steroid levels, whereas

powerful films tend to produce further elevation. In connection with the latter films, an important methodological point is the "fit" of a given film with the attitudes of a particular audience. A film that constitutes a powerful stimulus for one type of audience may be a weak stimulus for a different sort of audience.

Evidence has accumulated over the past few years that the pituitary-adrenal system is a sensitive reflector of the degree of behavioral arousal of the organism and presumably of tonic states of excitation in the CNS. If this notion is correct, we might expect to find evidence of such organismic arousal under conditions of elevated corticoid levels by studying what the brain does when it is not immediately interacting with the environment, as during sleep. By seeking such relationship we hope to further elucidate the psychophysiological adaptation of the organism to stress, to explore individual differences in reaction to stress, and possibly to further understanding of those maladaptations to stress which contribute to mental and psychosomatic illness. Thus we are seeking a possible relationship between adrenocortical function and the quality of sleep and dreaming, employing the latter as behavioral indices of tonic states of organismic arousal.

Electroencephalographic and electroculographic records are obtained of sleeping subjects, concurrently with the study of their blood and urine 17-hydroxycorticosterone levels. Both types of procedures are carried out under circumstances when the corticoid levels are elevated, and when they are at stable baseline levels for the subjects under study. Under these contrasting conditions, the electrophysiological measures are assessed in terms of sleep depth and the number and duration of dream periods, while the manifest dream content is rated on a dimension of "threat" expression. Thus far the subjects employed have been normal volunteer controls. Data collection under the conditions described has now begun. The first phase of the study has been concerned with studying techniques of assessing the depth of sleep, the occurrence of dreaming, and the collection and rating of dream content.

In our Personality Development Section, we have selected for study one of the commonly occurring experiences which may stimulate personal growth for many people, but may also lead to breakdown for others: the transition from high school to college. Our aim is to determine some of the sources of problem-solving effectiveness in adolescence. We hope to learn about the kinds of factors in our subjects' life experience, family, personality, and current environment which seem to be related to their finding effective ways of dealing with stress during the period under study.

Under the leadership of Dr. Earle Silber, we selected a group of students with the following minimal criteria in mind, as giving some indication of mental health: (1) evidence of competence in school work; (2) evidence of ability to make and maintain interpersonal closeness with at least one person outside of the immediate family. All the students in our sample were exposed to the demands of a college preparatory course in a good public high school, and most originated in a similar socio-economic background. The sample was drawn from the senior class at the Bethesda-Chevy Chase High School, which numbered 530 students, about 53% of which were girls. There are 20 students in the sample we chose for intensive study.

In selection of the 20 students the following steps were carried out: all of the students were in the senior class, were exposed to a short talk telling about the project and asking for their cooperation. Then a letter was sent to all of the students in the senior class, and the students were asked to sign this letter if they wished to volunteer. Parental signatures were also required. The letters were then returned to the school, and also gave consent for us to have copies of the students' transcript records. We picked students in the top half of the class who would be going to colleges not too distant, so that we could visit them if we desired, and also students who seemed to reveal some concentrated interest as reflected in their extra-curricular activities; and also those who seemed to have made a favorable impression upon their teachers as evidenced by personality ratings, which was part of the transcript record. From a volunteer group of about one hundred, we selected 39 as probably meeting our criteria, and carried out a screening interview with these 39 students. The 20 intensive cases were chosen from these 39 and were seen for a series of interviews on a weekly basis.

A special projective test was constructed by Dr. George Coelho and Dr. Silber, patterned after the Thematic Apperception Test, consisting of eleven pictures designed to elicit characteristic modes of dealing with certain potentially stressful situations. There were two sets of pictures; one for boys and one for girls. The pictures included scenes such as posting of final grades and couples sitting close in a car.

Content of the subsequent interviews included investigation of the following areas: academic work, peer group relations, values, constructive experiences during high school, dating, plans for marriage, the family situation, areas of responsibility within the family, description of the parents, decisions about going to college, anticipation of college life, plans for living at college, academic preparation, and attitudes about college organizations.

During the summer months we continued our interviewing to obtain information about the student's past history, medical history, and personal development, as well as keeping in touch with some of the events in his current experience.

Along with the individual interviews, there was a series of four group interviews held with four students who were designated as group leaders. The purpose of the group interviews was to understand more of the dominant values of the high school and its formal and informal organizations. We included this as a way of helping us to understand the background against which our individual subjects operated, that is, the current high school environment.

We have also gotten acquainted with the parents of our students and during the summer months, all of the parents (with a few exceptions) were seen in a joint interview. We plan to continue interviews with the parents. We have, wherever possible, seen our students just before their departure to college, to see what changes may be present on the eve of actually leaving home.

Essentially then, we have had an opportunity to get acquainted with a group of 20 college-bound students while they were still in high school. By beginning with each student while he was still in high school, we had an unusual opportunity to study the techniques of personal problem-solving in the high school years, as well as the anticipatory phase of the transition to college. We have also had an opportunity to get acquainted with the student's past history and to have some direct experience with his parents. We have now begun interviewing our students after they have moved into the freshman year at college. We made a field visit to each of the colleges to see the student after he had been away at college six to eight weeks. We interviewed some of the students when they were home for Thanksgiving, all of them during Christmas vacation, and plan to see each one again during Easter vacation. At the end of the freshman year, we plan another intensive series of interviews to review the entire year. This field study has benefited from our collaboration with Drs. Morris Rosenberg and Leonard Pearlin of the Laboratory of Socio-Environmental Studies.

Our interest has been in clarifying the behavior of competent adolescents, and particularly in learning how they cope with the stresses of this transitional period. Further, we are attempting to make systematic comparisons of these students with those who break down during the freshman year and are hospitalized in the Clinical Center.

In order to study sources of interference and conflict in the developmental process, we have hospitalized a group of adolescents in whom there has been a significant area of developmental failure, serious enough to make adaptation to the demands of a first-year college experience temporarily impossible. We selected the situation of the freshman in college because it provided an opportunity to observe the impact of a new situation with new demands, both internal and environmental, upon the adolescent.

The 3-East project has been in operation since January 1959, under the leadership of Dr. Roger Shapiro and Dr. Harold Greenberg. Since the opening of the ward we have hospitalized twelve college freshmen who were in sufficiently emotional difficulty to make it advisable that they leave school. These patients have represented a wide range of diagnostic categories including acute schizophrenic reaction, paranoid personality disorder, other types of character disorders, and some symptom neuroses.

Our first efforts with this group of patients involved organizing an effective program of therapy for them. This has included individual psychotherapy on a 3 or 4 hour a week schedule for all patients, meetings of the entire patient group twice a week, the development of an activities program, and therapeutic interviews with the patients' families.

Some of the research questions we hope to answer from data available from the therapeutic program. Other questions we are trying to get at in specially designed research interviews with the patients, their families, and their friends. Our questions up to now have been essentially in two areas. The first area includes questions about the nature of the new and presumably stressful situation (the experience of the college freshman), and about the psychological equipment the individual brings into the situation; what his resources are in coping with it, what directions his adaptive efforts take. The second area includes questions about factors that might determine such behavior in individuals, and have up to now been chiefly investigations into aspects of his previous life experience which might account for some of the idiosyncratic responses we observe. In addition to information along these lines available from the data of individual therapy, we are now in process of designing a standardized interview in which one of us will attempt to get at this material specifically with each patient.

We have several other sources of data about the patients' adaptive efforts in the college situation. One is the observations of friends, teachers, counsellors, etc., close to the patient during his attempts to adjust in his first year of college. We have sent one of our staff to the college setting in which each of our patients has experienced difficulty, to interview a number of people who were close to the patient, and get a picture from them of the coping efforts made by the patient and the kinds of situations he had to cope with there. We have been particularly interested in the kinds of efforts the patient made to form friendships in the college setting and have addressed many questions to the patients' friends about the nature and quality of relationship that existed between them and the patient.

We have attempted to use observation of the patients' adaptation to the new experience of hospitalization and living in the ward situation as another source of data about the nature and quality of his coping efforts. Again we have been particularly interested in how he goes about forming new relationships and have asked nursing personnel to make an ongoing record of the developing relationship between themselves and the patient. We hope to learn how these patients relate to a variety of individuals, and if we can to clarify why for them formation of new relationships as a type of adaptive behavior is so difficult, and when it occurs is often unsuccessful in reducing their anxiety and maintaining their self esteem.

With regard to the second area of questions, most of our efforts to understand the personality development of our patients have involved study of relationships within the families in which they have grown up. Interviews with parents and siblings have been conducted with particular interest in what could be learned about their conscious and unconscious attitudes toward the patient, their feelings about the patient's assets, their image of his liabilities, and their readiness to see him as a separate individual. We also want to obtain from the parents as thorough a picture as possible of their own experience as adolescents. As they recall their own adolescence, we hope to gain some knowledge of what sources of anxiety existed for them as adolescents and how they dealt with these threats. We then want to determine how much the adolescence of their child has revived this anxiety in them, and how much they have responded with anxiety to their child's explorations in an area of anxiety in his own adolescence may tell us something about the kinds of developmental experiences which promote and those which impair adaptive behavior in adolescence.

During 1959 the Section on Family Studies, under the leadership of Dr. Lyman Wynne, has deepened its investigations of family relations in schizophrenia. Broadly speaking, the work of the past year has strengthened the previous impressions that the patterns of interpersonal relationship within the families of schizophrenic patients differ from those found in the families of nonschizophrenic psychiatric patients and that the schizophrenic offspring occupies a different family role and has had a different familial experience from nonschizophrenic siblings.

Two independent approaches have been useful during the past year in producing new ideas and data which bear upon these problems: family psychotherapy, and psychological testing of entire families. All twenty-five families which have been studied intensively in this project during the past two years have been seen in "family therapy" in which both parents, hospitalized patient, and siblings are seen together in exploratory, psychoanalytically-oriented psychotherapy. In effect, the communication and interpersonal patterns of the family system are not reconstructed in family therapy but are observed directly. The very recent addition to the facilities of one-way observation windows to the interview rooms has expanded the research opportunities in studying the family therapy sessions.

The family therapy approach has led to the conclusion that the traditional use of individual interview descriptions of family interaction is of very dubious reliability. Repeatedly, when family members describe disturbing events that have just happened within a therapy session, major aspects of the events are distorted or omitted by all of the family members. However, direct observation illuminates behavior that could not be reported by the family members because it has occurred outside of their awareness.

Although this project is primarily oriented toward untangling the relation of family patterns and schizophrenia, the use of family therapy as an exploratory research tool has led to a significant by-product: a contribution to the development of the theory and technique of family therapy, an approach which has recently achieved considerable recognition as a new and potentially valuable addition to the therapeutic repertoire of psychiatrists. Observations and ideas within our group about the advantages and limitations of family therapy, including the relation of family therapy to concomitant individual psychotherapy, have been evolving into a conceptual framework during the past year.

The criteria for selection of families compared in this project have minimized all presenting differences except one: the presence of a schizophrenic (or psychiatrically ill and hospitalized), versus a nonschizophrenic young adult offspring. In other respects, the families can all be characterized as consisting of two parents and at least one sibling of the presenting patient, as having predominantly American middle-class customs and values, and as sharing a willingness to explore jointly the difficulties involved in the psychiatric illness.

During the past year procedures for evaluating both the diagnostic and the sociocultural background characteristics of the families selected have been systematized and sharpened. Beginning with background interviews by the psychiatric social workers of the project, a procedure for recording historical material as it cumulatively unfolds has been developed.

In comparing the families of schizophrenic and of non-schizophrenic psychiatric patients, the work in family therapy has been useful in suggesting a number of hypotheses of significant differences. For example, the familial response to "deviant" behavior of a schizophrenic family member (that is, behavior outside the code or subculture of the particular family) generally has the effect of fragmenting the behavior into concrete aspects; for example, by ignoring the most obvious intentions of the deviant family member and giving only a very limited, literal interpretation to a trivial aspect of the behavior; such family responses reduce and confuse the central meaning and intent of the behavior into incoherence and uncertainty about the validity and authenticity of one's own perceptions and intentions. In contrast, the familial response to "deviant" behavior in non-schizophrenic families typically involves, for example, relatively straightforward accusations and the production of guilt in the deviant person, but without reducing his capacity to trust his own senses about what he intended.

Such hypotheses, as they become progressively refined, seem to lend themselves to systematic comparison studies relevant to basic features of schizophrenic experience. Procedures are now being developed for making systematic use of family therapy transcripts in such comparison studies and plans are under way to compare these and other families using standardized procedures focused on particular aspects of these hypotheses.

In addition to family and individual interviews, three other sources of data have expanded in their contribution to the family studies program during the past year: (a) nursing observations, both the traditional observation of individual patients and the observation of patients interacting with their families, who are encouraged to visit on the nursing unit; (b) home visits, with the entire family present, have become a regular part of the work with all families; naturalistic observations have been made for various lengths of stay by staff members having different roles - nurse, social worker, psychiatrist; and (c) art therapy, as a tool for diagnostic and therapeutic work with entire families, as well as individuals, has, in selected instances, been quite informative.

Parallel to the direct clinical work with families, a consultant to the project, Dr. Margaret Thaler Singer, has been studying "blind" the psychological test protocols obtained from entire families seen in the project. Given first the protocols of the family members but not of the patient, Dr. Singer predicts which families have a schizophrenic member and then, given the patient protocols, matches patient with family. Thus far, with eleven families, a remarkable accuracy has been achieved. Most interestingly, these results could not be obtained using traditional methods of interpreting test protocols by their content. However, when attention was paid to the form of the thinking used by the subjects, for example, in the way in which attention and meaning were manipulated, then accuracy of differentiation was possible. The convergence of these test findings with the clinical findings previously mentioned has been striking and will be intensively examined in further evaluations of the material already obtained and in future investigations of additional families.

Clinical Neuropharmacology Research Center
Joel Elkes, M.D., Chief

The past year has seen an increasingly fruitful interaction between the CNRC and Saint Elizabeths Hospital, and has further defined areas of mutually complementary interest. This interaction has been manifest in a number of steps taken by the Hospital to assist the program during its formative period. Dr. N. Waldrop, formerly Chief of the William A. White Service, has been promoted to the newly created post of Associate Director of Research for Saint Elizabeths Hospital, and, in this capacity, has given valuable assistance in the implementation of the CNRC program within the total Hospital setting. A new Biometrics Branch has been created by the Hospital. This is to collaborate with appropriate personnel of the CNRC, and the Biometrics Branch of NIMH, in meeting the statistical needs of the program. The Chief of CNRC, and the Director of Training of the Hospital are actively exploring ways and means whereby the training potential of the CNRC could be used to optimum advantage, without unduly infringing on the time of CNRC personnel. Already, requests have been received from residents of the Hospital to work in the laboratories of CNRC over and above their normal duties, and a resident has been assigned to the CNRC by the Hospital to collaborate in an ongoing program of clinical investigation in the wards of the William A. White Service. The regular internal and Guest Seminars of CNRC have attracted wide participation from the Hospital. Taken together with joint staff conferences, regular teaching rounds within the William A. White Building, and the spontaneous formation of small groups centered around subjects of common interest, they have greatly strengthened the links (both personal and administrative) between CNRC and the Hospital. The Research Committee of the Hospital, of which the Chief, CNRC, is Chairman, now comprises four members of the CNRC staff (Dr. I. Whitfield, Dr. H. Weil-Malherbe, Dr. G. C. Salmoiraghi, and Dr. M. Hamilton). The work of this Committee (which meets at monthly intervals to consider research proposals, both from the CNRC and the Hospital) has gone some way towards defining standards, and devising procedures designed to further research within Saint Elizabeths Hospital.

Despite these hopeful trends, however, it would be idle to ignore some deep-seated difficulties which confront the CNRC, and the Hospital in the pursuit of an advanced program of research, and of training. Staff shortage, at professional and non-professional levels, takes first place, and is acutely felt in the William A. White Service, as well as in other parts of the Hospital. For similar reasons (and despite every effort to participate in a common research program) the Pathological

Laboratory of the Hospital can only meet a very limited number of requests for studies arising out of the program; a priority system had to be strictly adhered to in the allocation of research projects requiring such laboratory studies. Furthermore, a number of medico-legal issues connected with the pursuit of clinical investigations within the confines of the Hospital remain unresolved, thus favoring the use of established forms of treatment, and holding in abeyance the introduction of procedures of a more novel and exploratory nature. Lastly, the lack of intermediate treatment facilities such as Out-Patient, Day Hospital, Night Hospital, and Club facilities is being increasingly felt by the CNRC, as the rehabilitation of the Center, and the Hospital, gathers momentum. The Hospital is fully aware of these needs, and, within the stringent financial limitations imposed upon it by present circumstances, is doing its best to bring these facilities into being.

There is one further aspect which has become clearly apparent during the past year of the operation of the Center. The physical separation of CNRC from the Clinical Center at Bethesda has been increasingly felt by members of staff, and the hope has been steadily expressed that some aspects of the Neuropharmacology Program could, with advantage, be pursued at the Clinical Center. The physical representation of the subject of Neuropharmacology, both at Saint Elizabeths Hospital and at the Clinical Center, would make for more ready interaction between the program of CNRC and related aspects of the programs of the Laboratories of Clinical Science, Adult Psychiatry, and Psychology of Clinical Investigations, NIMH. Furthermore, it would also encourage the circulation of personnel between the Clinical Center and the CNRC facility, and thus reduce the sense of isolation of CNRC personnel, as well as increase the contact between Saint Elizabeths Hospital and the Clinical Center. There is, in fact, every evidence that such a move would greatly enhance the mental climate within both the CNRC and the Saint Elizabeths campus, and, through closer liaison of the Hospital with the Clinical Center, contribute to the steady evolution of an academic setting and attitude within the Hospital.

For the purposes of the present report, the division of the Center into Sections of Psychiatry, Chemical Pharmacology, and Behavioral Sciences is adhered to. It has, however, become increasingly apparent that, while serving a very useful purpose during the early formative period of the Center, these terms no longer fully connote the principal themes to which the program of CNRC wishes to be committed. It is hoped that these themes may receive their formal recognition in an internal reorganization of the Center during the coming year. During the interim period Dr. G. C. Salmoiraghi has made a valuable contribution to

the evolution of the Center by assuming responsibility for central laboratory services common to all Sections, by assisting the Chief, CNRC, in the coordination of the programs as a whole, and by representing him on appropriate occasions.

Section of Psychiatry

The slender resources of the William A. White Service of Saint Elizabeths Hospital have encouraged Drs. A. Hordern, of CNRC, and J. Lofft, of Saint Elizabeths Hospital, to initiate a comparative study of two phenothiazines within six wards of the Service. The broad aims of this study were essentially fourfold. In the first place, it was hoped to explore the limits of feasibility of a number of procedures, and to determine the most economical way of their use. Secondly, it was hoped to define ways and means whereby the mere pursuit of such a study could contribute maximally to the training of staff, and thus to the care of patients not directly involved in the study. A third aim was to test various clinical research instruments (and more particularly rating scales) in terms of their usefulness and reliability in the day-to-day setting of a busy mental hospital ward. Finally, it was hoped to determine the effect of such a clinical research program on the attitudes and aspirations of the staff. In this preparatory study, therefore, information regarding the relative merits of the two drugs used (Trifluoperazine and Prochlorperazine) was regarded as incidental; the real yield lay in a contribution to the solution of some controversial methodological problems, of which seven received particular emphasis. These were (1) the role of structural milieu in ward management; (2) the effect of inter-personal milieu, and nursing care in the management of patients; (3) the mobilization and cultivation of latent research skills in the nursing staff; (4) the design of the type of trial best suited to meet the requirements of (1), (2), (3); (5) the assessment of patient behavior; (6) the assessment of attitudes towards a clinical research program in a hospital ward; and, finally (7) the most economical way of collecting, tabulating, and processing data. Although the study involved only twenty-four specially selected patients, the simultaneous pursuit of the program in six wards proved an interesting, and (from the point of view of staff training) helpful feature. The patients were divided into six groups of four, and were observed in special day rooms (decorated by the patients) in six wards of the Service. In each ward the group of four formed the nucleus of a larger group of ten patients, the six additional members consisting of chronic schizophrenics receiving their customary medication. The six groups were consistently nursed by selected day and evening nursing assistants, a carefully defined routine being followed in each case. Regular group discussions with

personnel contributed to the training of personnel, and familiarized them with the regular instruments which were being used. Thirteen different rating scales were employed, the details of which are given elsewhere. According to needs these were administered at daily, twice weekly, weekly, monthly, and three-monthly intervals.

The results of this study to date are distinctly encouraging. The methods used have proved feasible, and economical of staff time. Attitudes in personnel throughout the study have been monitored. A trial of this kind would appear to be an economical training device in group nursing and rehabilitation techniques. There appears little question of its positive effect on the mental climate of the various wards. At the initiative of the staff of Saint Elizabeths Hospital, the study is now to be extended to include a further 126 patients who are to be transferred especially to the William A. White Service for purposes of rehabilitation; it is hoped that parallel studies will be initiated in other services of the Hospital. A visual aid Exhibit, prepared by the principal investigators, has been found to be a useful demonstration and teaching device, and is to be shown in an expanded form at a forthcoming meeting of the American Psychiatric Association.

In an attempt to study social interaction within a chronic mental hospital ward in a quantitative way, Dr. S. Kellam is in the process of developing an objective method for the visual recording, and measurement of the relative association, or isolation, of the individual patients within the ward setting. Information regarding the number of contacts of a patient is noted by nurses and aides on a time-sample basis, and recorded on a specially constructed grid by the means of mobile map tacks. The clustering of these tacks readily reflects social contacts, a ward log supplementing this visual device. The method is already giving useful objective indications of the group structure of the ward, and the prestige systems existing in the wards. It should be of particular interest in an examination of devices or procedures (including drugs) designed to render the patient more accessible to the milieu in which he functions.

In an attempt to study factors making for chronic hospitalization, Dr. D. Lipsitt has engaged in an examination of the role of so-called 'dependency' in the psychiatric in-patient, and of the possible, though unintended, collusion between the needs of the over-dependent patient, and an over-protective attitude in a ward milieu. The term 'dependency' is in obvious need of clarification, and measurement. Two hundred patients form the subject of this study. The instruments used include selected scales from

Minnesota Multiphasic Personality Inventory, a review and scoring of the patient's case record, a psychiatric interview, and behavior ratings; other instruments are being developed. Present trends indicate that long-term patients deny their dependency (showing a higher denial and a low dependency score), whereas patients admitted for the second time tend to accept, admit, and overtly display their need for dependency. It is hoped that, with growing experience in this area, dependency scores may be tested for predictive value; and, perhaps, be put to use in selecting appropriate treatments for patients with varying degrees of dependency needs.

In a cognate vein, Dr. M. Geller is developing methods for the study of the transition of the chronic schizophrenic patient into the community, with special reference to the use of the pharmacotherapies and group therapeutic techniques to facilitate such transition. Two matched groups of eight patients are being used as a pilot sample in this study. Experience in the conduct of group sessions with chronic schizophrenics, and the recording and analysis of data is being gained at present; though this, of necessity, is a slow process. It is hoped that the utilization of analytically oriented group psychotherapy may, in time, allow one to exploit the assets of the chronic patients during trial visits, and during an initial period (of, say, six months) following discharge. It is also hoped that by providing regular group therapy during this stage of transition the patient may be successfully weaned from his undue dependence on the hospital, and encouraged to make a successful adjustment in the community.

Drs. Harwood, Hordern, and Lofft, together with a number of other colleagues, are studying the effects of Imipramine on plasma 17-hydroxycorticoid levels in eight depressive patients, and are attempting to correlate these findings with clinical responses to the drug, as well as its effect on protein-bound iodine and plasma catecholamine levels. This study is at present in progress, and no biochemical data are as yet at hand.

Dr. R. Gentry, CNRC, and Dr. N. Waldrop, of Saint Elizabeths Hospital, are gaining experience in the use of an optical transducer device for the study of changes in finger blood flow. This is to be used in a number of psychophysiological investigations, and may be found particularly helpful as an index of autonomic activity in word association studies.

Section of Chemical Pharmacology

In continuation of previous work, Dr. Weil-Malherbe has attempted to refine his published method for the estimation of epinephrine and norepinephrine in plasma. It was found that the results obtained by the trihydroxyindole method were only slightly lower than those obtained by the ethylene diamine method. Studies on the chemical mechanisms of ethylene diamine condensation indicate that in the reaction with epinephrine a single compound is formed as a major product and that side reactions occurred to an insignificant degree. In the reaction with norepinephrine, on the other hand, two or three major products are formed from catechol and dihydroxy-mandelic acid. The need for a reliable method for the estimation of catecholamines is an urgent, yet persistent problem, and it is hoped that Dr. Weil-Malherbe's critical reappraisal of existing methods (including his own), may be a useful contribution to the field.

In a cognate area, Dr. H. Weil-Malherbe and Dr. E. R. B. Smith are attempting to develop a method for the estimation of urinary metaephrine and normetaephrine by a modification of the method of Euler and Floding. The zinc ion was found to be an essential catalyst in the formation of fluorescent derivatives of these two compounds. Taken together with the methods now being developed in the Laboratory of Clinical Science, Clinical Investigations, NIMH, the availability of a quantitative method for the estimation of metanephrine and normetanephrine in urine should make it possible to account for the major metabolites of epinephrine and norepinephrine in man. It is intended to put these methods to use in appropriate pharmacological studies.

Dr. H. Weil-Malherbe and Dr. H. Posner are in the process of examining the effect of DOPA on the synthesis of catecholamines in the brain after their depletion by reserpine. It had been shown in previous work that the intravenous injection of DOPA accelerated the reappearance of catecholamines in rabbit brain and, equally, that there was a significant redistribution of intracellular epinephrine, norepinephrine, and hydroxytryptamine following administration of reserpine. The effect of Dopamine on these processes is being examined further.

In pursuit of previous studies, Dr. Szara is now in the process of developing quantitative methods for the estimation of the 6-hydroxy derivatives of psychosomimetic tryptamine derivatives, with special reference to the estimation 6-hydroxydimethyltryptamine and 6-hydroxydiethyltryptamine. This has involved the organic synthesis of reference materials, and a comparison of these with material isolated from urine. A sensitive and specific spectrophotometric method, measuring 1/ μ g/ml

of 6-hydroxydiethyltryptamine in urine had been developed. This has been found useful in following the 6-hydroxylation pathway of diethyltryptamine, a compound shown by Dr. Szara to possess marked psychosomimetic properties. In a promising juxtaposition of biochemical method with animal behavioral techniques, Dr. Szara, of this Section, and Dr. Eliot Hearst, of the Section of Behavioral Sciences, have attempted to study the relation of the rate of 6-hydroxylation of diethyltryptamine to the threshold required to elicit behavioral change in the individual rat. It was found that the rate of transformation of dimethyltryptamine to its 6-hydroxy derivative differed from animal to animal, and that the rate correlated well with the thresholds needed to elicit such behavioral effects. The evidence thus pointed to 6-hydroxylation as an important, and possibly essential, step in the production of behavioral change by tryptamine derivatives. It is also of interest that the 6-hydroxylation of diethyltryptamine by a microsomal enzyme system provides one of the few instances of the production of a psychoactive agent in vivo. It will be of interest to examine the effects of ataractic and other agents on the rate of this 6-hydroxylation process.

Dr. H. Posner has been following the metabolism of some phenothiazines in man, with special reference to possible excretion of phenolic metabolites in urine. By incubation of urine extracts with glucuronidase, he has obtained evidence suggesting that glucuronides constitute a considerably larger fraction of the excreted metabolites than sulfoxide derivatives. In an admittedly difficult study, Dr. Posner is attempting to develop methods of identification and analysis of the various metabolites of chlorpromazine and is hoping to use these in an intensive study, both of excretion patterns of phenothiazines in the individual patient, and in studies of the behavioral effects of a number of key metabolites in the experimental animal. As in the case of Dr. Szara, Dr. Posner is planning his biochemical studies in conjunction with Dr. Eliot Hearst of the Section of Behavioral Sciences; both studies being attempts to correlate individual biochemical variation in the metabolic handling of a drug with behavioral effects, and thresholds for such behavioral effects.

Dr. Posner has also carried out an extensive survey of the urines of selected patients with the view to isolating suitable case material (such as phenylketonuria, alcaptonuria, tyrosinosis, porphyria) for subsequent study. Although this survey of some 286 patients did not yield the material intended, it drew attention to certain anomalies in the Ehrlich indole reaction, which led Dr. Posner to examine the possible

role of metabolites of chlorpromazine in this reaction. It is this incidental finding which led Dr. Posner to his present study of the disposition of the phenothiazine derivatives in man.

In conjunction with Dr. A. H. Stewart of Saint Elizabeths Hospital, Dr. T. Harwood has studied the effects on plasma 17-hydroxycorticoid levels in six patients being treated with the drug for symptoms of depression. In keeping with previous findings by others, the 17-hydroxycorticoid plasma levels were found elevated in these patients prior to treatment. There was a fall in these levels following iproniazid administration; though the degree of clinical response did not necessarily correlate with this alteration in 17-hydroxycorticoid concentration.

Dr. Cambosos has been engaged in a recalibration and development of the Chaney colorimetric procedure for the determination of protein bound iodine levels in serum. The modification has increased the sensitivity of the method about five fold, making possible the determination of PBI levels in about 0.1 ml. of serum. This should thus prove useful in longitudinal studies (both clinical and experimental) where frequent blood sampling may be required.

Section of Behavioral Sciences

The Section of Behavioral Sciences has continued its studies of the mechanisms subserving the coding of information along the auditory pathway, with special reference to an analysis of the role of inhibitory mechanisms in the cochlear nucleus. One such study, carried out by Miss P. Stopp, has centered on an analysis of unit response patterns of the avian auditory pathway, as followed by microelectrode, within the nucleus mesencephalicus profundus of the pigeon. It was found that, despite a lack of differentiation of the cochlear receptors in birds into inner and outer hair cells, the pattern obtained showed remarkable similarity to those observed in the much more highly organized auditory system of the cat.

In another study Dr. J. B. Fotheringham has attempted to influence the inhibition of unit activity normally seen in the inferior colliculus of the cat following appropriate two-tone stimulation. A number of well-known centrally acting drugs were used. Significantly, none of these noticeably affected the discrete inhibitory process operating at this level. A similar lack of responsiveness was noted in the cochlear nucleus by Dr. A. S. Schwartz. The results thus tentatively

suggest the existence of local (and possibly peri-cellular) barriers at high central level. In an attempt to test for these, peri-cellular micro injection will be attempted, though of necessity the experimental hazards of this procedure are considerable.

Dr. R. Gumnit has continued to study Direct Current changes in the auditory cortex of the cat in response to auditory stimulation. In view of the sensitivity of these changes to slight variations in experimental condition (such as degree of anaesthesia, moisture, and temperature of the cortex) rigorous control of these had to be assured, and optimum conditions defined. A cell suitable for Direct Current recording has been devised and tested. Results to date suggest the existence of Direct Current changes in the auditory cortex, and particularly a localization of these changes to Auditory Area I. The role of Direct Current changes in the handling of sensory information is still controversial, and any established facts in this area must be judged welcome.

Dr. R. P. Michael, a Guest Worker at the Center on a Rockefeller Fellowship, has made a useful beginning in developing a cannulation and microinfusion technique, which, it is hoped, may make it possible to slowly inject small amounts of drugs directly into selected areas of the brain in the conscious monkey subjected to simultaneous behavioral study in an operant conditioning situation. So far, the method has been used in four Rhesus monkeys; approximate thresholds for chlorpromazine, injected directly into areas of the reticular formation, have been obtained. It is quite obvious, however, that a refinement of the technique is essential before any further study in this area can be undertaken. Time expended in developing this technique, however, may be well worth while; since (particularly if combined with biochemical and endocrinological studies) it may offer a reasonably direct approach to an analysis of the regional physiology and pharmacology of the brain stem. It is hoped that following Dr. Michael's return to England the work may be continued by other members of the group.

An independent area of investigation is being opened up at the Center by Dr. G. C. Salmoiraghi. In previous work, carried out with D. B. Burns, at McGill University, Montreal, Canada, Dr. Salmoiraghi, using extracellular microelectrodes, had attempted to determine the location and pattern of discharge of respiratory neurones in the brain stem, and to account for the rhythmic nature of respiration in terms of reciprocating inhibitory mechanisms. He is now hoping to extend these studies; and, more particularly, to elucidate further the

mode of action of CO₂ and of other drugs on these mechanisms. The technical difficulties (particularly those connected with movement artefact) are very considerable; yet it is hoped that an elucidation of the mode of action of drugs on rhythmically discharging cells of the medulla may contribute to an understanding of the action of drugs on rhythmic processes elsewhere in the brain stem. Furthermore, the concepts developed by Dr. Salmoiraghi to account for the discharge of respiratory neurones may find their application in the medullary centers controlling cardiovascular phenomena. In view of the striking involvement of central autonomic centers in some phases of stress, and of mental disorder and the effect of drugs on such phenomena, a discrete analysis of the organization of these central steering mechanisms is deemed desirable, despite the long-term nature of such an undertaking.

Dr. Eliot Hearst, in conjunction with Dr. Murray Sidman of the Department of Experimental Psychology, Walter Reed Army Institute of Research, has continued a study on the aversive nature of a conflict producing stimulus in the rat. Animals were trained in situations which produced conflict, but which, equally, enabled the animal to escape into a neutral situation. In experimental situations allowing choice between positive (reward), negative (punishment), and neutral situations, neither positive nor negative situations alone activated escape into such a neutral situation; this escape apparently depending on an interaction between positive and negative elements.

As indicated earlier (under 'Section of Chemical Pharmacology') Dr. Hearst and Dr. Szara (of the Section of Chemical Pharmacology) have joined in the study of individual differences in susceptibility of rats to diethyltryptamine. Inter-animal variation in regard to responses to psychoactive agents is a relatively unexplored field. It is hoped to pursue these findings further using compounds other than the ones so far employed.

Child Research Branch
Joseph D. Noshpitz, M. D., Acting Chief

History of the Child Research Branch During the Year

1959 was a year of crisis and change for the Branch. In June, 1958, Dr. Redl had announced his forthcoming departure. After a careful review of the studies nearing completion, and consideration of the developing needs of the total Clinical Investigations program, it was decided to terminate the clinical work of the Branch in July, 1959. Suitable arrangements were made for the patients who had been under treatment, and a number of the research staff undertook the responsibility of staying on until June, 1960, in order to complete the working up of some of the data previously gathered.

There were, at the time, two groups of patients under study. The one group, which had been in treatment for some 5 years consisted of five teenage boys who lived in the Children's Treatment Residence and will be hereinafter referred to as the cottage or the residence group. The other patient coterie comprised 8 latency age children who had been admitted in September, 1959, after a brief previous hospitalization for diagnostic study; they were housed on Ward 4E and will be referred to as the ward group. After the decision to terminate the program was made, all these patients were accordingly prepared for discharge and/or transfer to other institutions during the latter part of the spring. The residence patients, now faced with the prospect of a termination that they had known must come some day but which they had not anticipated quite so quickly, showed progressively severe breakdown in morale, controls, and overall adjustment. Behavioral upset became rife to the point of becoming overwhelming; staff morale followed suit; and it required a series of intensive staff discussions followed by confrontation of the patients, both individually and as a group for everyone at the cottage to be able to re-orient himself and face the future in an effective manner. In a sense the emotional upheavals in the staff paralleled those of the patients on every echelon; it was only after prolonged and intensive work on these issues that the various team members were able to regain their sense of proportion, see the salient parts of the reality before them, to master these, and communicate this to the patients.

Administratively serious problems were faced in terms of future placement and follow-up planning for the cottage patients, and a number of conferences were held at various

levels throughout the administrative structure, the upshot of which was a decision to provide financial backing for placement of three of the youngsters. After careful consideration of several residential treatment centers, it was decided to place three of the patients at the Berkshire Farms School in Canaan, New York. A contract was let for this purpose by the National Institutes of Health and the boys were transferred in July, 1959. A fourth youngster was sent home temporarily pending our finding a place for him; he was finally admitted to the Spaulding Youth Center in New Hampshire. The fifth residence child was returned to his own home. An active follow-up program is being continued with a half-time social worker assigned to the project, to make monthly visits both to the parental homes and to the current placements of all the boys.

The ward program terminated somewhat less traumatically, since at the time of admission, the patients had been informed that they would be staying only until the coming summer. As summer approached, most of them were able to accept the fact of the termination without as severe a degree of disturbance. It was nonetheless, a difficult episode for the staff who had been deeply involved in the project.

Many of the staff left at the time the patients departed, some were transferred to other services, while 11 stayed on to work on the data that had been gathered over the preceeding years and to prepare it for publication.

This work has proceeded and continues at present. The team structure is that of four full-time and one part-time senior researchers, three full-time and one part-time junior researchers, a half-time social worker, and two secretaries. Occasional meetings are held. Dr. Redl returns for regular consultations with each staff member. Some consultation takes place with former staff members, thus making it possible to amplify the recorded material in a useful way.

Research Developments and Tentative Findings

A. Projects completed and reported.

1. Individual Therapy and Psychopathology.

Two different styles of therapy were pursued in our two separate settings during the early part of the year. In the cottage, the five boys who had been in intensive, four-times-a-week individual therapy continued and terminated this therapy.

On the ward, the ward group which had been in a situation-gearred type of therapy showed increasing readiness to adapt to, to accept, and to respond to this approach--moreover, in some cases, they began to orient themselves toward the ward therapist in such a manner that they were in effect converting our original structure into a more formal type of individual psychotherapy, very largely by their own requests and attitudes. For example, they might insist on seeing the ward therapist only in his office, they wanted regular appointments, and they wanted him to avoid otherwise entering into their ward life. It was difficult to avoid the impression that the youngsters were able to make a remarkably rapid induction into a psychotherapeutic relationship in spite of very severe character problems. It will be important to re-examine and re-test in other settings, the possibility of utilizing such a method as an induction technique for the initiation of psychotherapy with hard-to-reach patients of this type. Little can be said about the possible long range benefits of such an approach--the period of time the patients were in treatment was too brief. Our effort was in the nature of a pilot study.

Returning for the moment to the individual therapy with the cottage boys, the aspect of the interdigitation of this therapeutic process with the on-going ward life demanded the attention of a number of the investigators, including the cottage mother and two of the therapists. A paper by Kitchener, Sweet and Citrin which was presented at the Orthopsychiatric meeting in 1959, traced out in meticulous detail the simultaneous working of parallel themes with the therapist in the playroom and with significant ward personnel on the ward. Attention was addressed to the phenomenon of breaks which occurred in the behavioral and therapeutic relationships and the ensuing hostile flood which submerged the entire observing ego. The ego-dynamics were described with emphasis on the precariousness of primary object relationships, the inability to endure tension because of the sense of unbearable helplessness and the certainty that no future gratification can be trusted, the sense of profound emptiness, the insatiable oral needs with the accompanying fear of their seduction, hunger, and destructiveness, the tendency to project the oral sadism and view the world as devouring, the intense castration anxiety along with the associated fear of the loss of inner substance. The resultant ego structure is one in which the acting out has the defensive function of denying the dependency and fear of disappointment and where it becomes imperative to maintain an illusion of omnipotence. Hence, projection, magical thinking, and conversion of passive to active are routine. Rapid shifting occurs in the level of ego functioning; the observing ego is not given much opportunity to develop or to play a role in personality actively. The capacity to learn

from experience is thus markedly limited and thought plays but a small part in the patient's adjustment. Appropriate management tactics were described starting with the recognition of the necessary re-living and re-capitulation of the most infantile layers of the patient's experience around incorporation, object loss and delay of impulse. Two technical developments were presented the first of which concerns the management of aggression. In this area, techniques which permit the therapist to join in the support and defense help re-align the child's collapsing ego and are more important than interpretation or prohibition. One way to achieve this is to turn the emerging aggression into a quasi-game. Another way is to feed the child's narcissism at a moment when he seems frightened. On the other hand, when the aggression is used in the form of manipulation, i.e. when the ego is pathologically strong rather than pathologically weak, it is important to employ interpretation or physical limit setting. The second development concerned choice in interpretation. It is essential that the interpretation be geared to the phase of treatment. Thus, when a child is communicating primarily through motor behavior, interpretations must be accompanied by or made through concrete behavioral responses. When a child has improved to the point where he can utilize symbolic communication, then symbolic gestures of one sort or another should be the rule for the therapist too. Only later in treatment when verbalization becomes important to the child, can interpretive efforts of a verbal kind impinge effectively. Readiness to shift among these levels as the child shifts during any treatment hour is of the essence. Many similar devices need be used by ward personnel with a parallel respect for the shifting states and the precarious ego situation of the patients. The confusion that may in time take place between significant ward persons and therapists are considered to be expressions of the patient's finding uniform respect for and response to his treatment needs.

2. Problems of technique.

The approach to patients through the life space interview as contrasted to individual therapy received its most thorough explication and documentation during the final months of the project. Many hours of life space interviewing with the ward patients who were not in individual therapy served to demonstrate the readiness of some of these youngsters to move from concrete discussions of specific behavioral events and upsets into more family centered and conflict oriented areas. Such conversations would sometimes progress into classical-seeming psychotherapeutic interviews. The cry: "Take me to

the playroom" became a popular and frequent one to be directed toward the ward doctor. A major factor in this seemed to be the omnipresence of the ward doctor who was often there evenings and week-ends so as to be continually available to pick up on moments of anxiety, loneliness, or simple need for some gratification as well as to handle the more intensive behavioral upsets. In addition, a mode of approach was employed in which the ward personnel often joined the therapist in these interviews so that what might otherwise have been complex and tricky stories to get straight, now became sharply focussed, accurate accounts of what went on with the full details immediately available, and with the possibility of the interpersonal relationships that had been disturbed by the incident receiving effective and ready clarification. This opened an entirely new dimension to the patient's perception of staff people individually, and of the interacting adult world collectively, and overtime seemed to have dramatic and influential effect. Aside from its therapeutic aspects, the training value of this procedure is very great; the changes in style and technique and the growth in professional maturity on the staff members was marked.

3. Problems in ego structure.

Two areas that received major thought during the first half of 1959 were those of Diagnosis and Ego Identity. The first involved the notion of making diagnosis a composite of several terms, i.e. each diagnosis would be a sentence composed of a number of clauses, rather than a single descriptive phrase of two or three words. Each part of the sentence was scheduled to be connected with a definite set of categories and the categories were in turn, the psychological past, the identity structure, the impulse orientation, and finally, the symptomatic behavior displayed by the particular patient. Various sub-categories under each of these, such as, over-stimulated, phantasy oriented, erotic-aggressive, and so forth were defined, and various formulations were then possible to describe particular manifestations in specific children. This set of diagnostic categories was developed exclusively in connection with the hyperaggressive child; it is hoped that specialists in other areas of childhood disturbance might also develop appropriate category classes, so that the possibility would emerge to put a number of such category sets side by side, and winnow their essential similarities and differences with an eye towards developing a more significant set of diagnostic terms.

As a derivative from this essay, the categories applied to the psychological past were in turn viewed in their relationship to the development of anti-social behavior in adolescence. The psychological events ensuing at puberty were viewed as intruders on a scene that had been prepared for by a process of over-stimulating, depriving or over-gratifying the child in the

preschool period, with the inevitable consequences that ensued therefrom. It was anticipated that this type of approach might serve to complement the sociological approach to delinquency where it is possible to account for a delinquency-prone population, but more difficult to explain why only a small percentage of such a population actually becomes involved with the law. If necessary psychological factors which may have been present in the past of the particular child who becomes delinquent can be seen as additions to the sociologic vectors, both functioning as necessary, but neither as a sufficient cause, a more definitive system emerges.

Similarly, the question of ego identity, what it meant, how it functioned, what its psychological and dynamic structure was, its relationship to the defensive aspects of personality, some of the forms it might take in latency children, etc. were explored and continue to be studied. In particular, the role of the choice for or against one's own chronological age was viewed as an essential polarity of identity formation in childhood. Other such polarities included the choice of the reality-phantasy issue, i.e., was someone a real person or a make-believe person; and the choice between the covert and the overt, i.e., was the child "really" to be a concealed individual beneath quite a different outward appearance, or was he to be someone who was what he was on the surface. Finally, there seemed to be a choice between having any identity at all or no identity (which amounts, in effect, to the choice between non-psychosis and psychosis.) Some children were so vague, so amorphous, so lacking in outline as to be labeled "diffuse" in our identity category.

4. Milieu Therapy and Life Space Interview.

In attempting to define what milieu therapy and residential treatment needed to differentiate them from other types of housing of disturbed children, the simultaneous employment of ego support and ego analysis as technical modalities in creating a therapeutic milieu were described. The notion of how the milieu can come to grips with a symptom without allowing the child too easy gratification of his acting-out on the one hand, or attacking him and increasing his defensiveness on the other, were exemplified. The need for the milieu personnel to respect the particular ego configuration of the youngster and give strength to his defenses when they were weak and when anxiety was high, was studied at some length and the correlated approach of interpreting symptomatic acts as defenses when these were strong was equally stressed. These two techniques alternating back and forth with the same child were seen as essential methods of working with him in the environment. Thus, a theory of residential treatment built on ego analysis and ego support was developed.

A group of clinical studies on experiences with self mutilation in children was presented at a symposium on this subject at the Orthopsychiatric meeting in 1959. Generally, these pointed up the interpersonal meanings as well as the masochistic and subjective aspects of this behavior. Self mutilating behavior was observed to be an attack on the person of the therapist in the case of a child prone to symbiotic fusion experiences; it was a symbolic act of control at a distance in youngsters who were not quite so primitive; it could be a manipulation of and a punishment for therapists; it could also be a coercive for achieving or forcing reactions of some kind out of the staff, and it might also have the value of a sort of masturbatory pleasure. Numerous case illustrations were cited.

A review of the thinking that had gone into the construction of the treatment cottage and of some of the problems that had developed around the use of space was also the subject of a paper. The notion of which elements in the spatial arrangements around a child's life can be combined and which need to be separated was examined at some length, and the impact of architecture on the treatment process was touched upon. In particular, the role of staff residence space and child residence space in terms both of the need for nearness, the nature of distance, and the kind of distance required were observed both for their advantages and disadvantages.

An additional contribution with important technical implications was an account of the developments around informing the cottage patients that the program was about to end. When the youngsters learned of their impending separation and termination, a highly anxiety-charged situation developed which in turn generated a series of tactics for countercontrol. This was described in some detail, i.e. such elements as surprise, concerted adult action, group plus individual interviewing, intensive and protected programming during the crisis time, active limit setting, and, above all, recurrent interpretation were blended into a combined approach with good success. This experience has many practical implications for the management of institutional crises.

5. Learning disturbances.

The modifications in school methods necessary for disturbed children were carefully studied. In one paper a five step series of modifications from normal school procedure was described involving a.) shortening the small group school sessions to fit the task involvement span of the group, b.) adhering to the lowest common denominator of academic working level, c.) choosing materials which were as free as possible from the predominant problems of

the children, d.) the design of procedures that were not ambiguous or dependent on a child's self control, and finally, e.) the attempt to demonstrate an understanding of the child's pathology while simultaneously discouraging the manifestations of it in the classroom.

In addition to these technical procedures, the counterpart of them, the impact of work of this sort on the teacher's personality was examined by one of our teachers and the nature and kind of growth that emerged were explored. In particular, an account was given of the major alteration in philosophy that had taken place between the time that the first long term group had been initiated into the classroom, and the time when the work with the second long term group was begun. This change involved moving from a position in which the teacher attempted to follow the patient at the youngster's own level, wherever that might be, to a position in which the teacher defined a certain range of limits within which the youngster must operate with the understanding that if the youngster overthrew the traces or stepped out of these limits, he must leave the classroom until he could accept this configuration and return. This change had profound implications for the entire learning process, the milieu, and the adjustment of the teacher. To begin with, the child was confronted with a much more clear-cut learning task with which he could cope either by refusing or rejecting or fighting against it some way, or by accepting it--in each case he always knew exactly what was expected of him, and where he was. Secondly, the milieu knew that the school was going to be rather taxing and specific in its demands and that youngsters might come out of school tense and pent up from having had to control themselves in order to meet the school demands--this made necessary the planning of much activity after school. Third, the teachers came to view themselves more specifically as educators rather than as teacher-therapists and could work within a structure that permitted them to apply their teaching skills in a specific and articulate way. It will probably remain an area of contention in the field for years to come, whether in general the more structured school is better for a child within a residential setting, or whether the residential school should be primarily and essentially a flexible instrument which views education as part of the treatment process and hence bends as the child bends. In any case this was the evolution that took place here, and seemed to have beneficial results.

The fact that the "ideal" school conditions under which the teachers theoretically worked here did not free the school from the basic problems that every school must face was reported in one communication. These basic issues were: the need to cope with groups, the need to cope with the body of

theory and techniques available to teachers, and the need of the school to live within a certain community and reflect the aims and attitudes of that community. Inevitably, intricacies in operation will arise on each of these levels, regardless of whether one is working in a school with tiny classes under the most carefully structured conditions, or whether one is working with huge classes and under the most diffuse conditions. The fact that the school is structured in a hospital and must thus come to grips with the attitudes, manner of life, values, personnel structure and so forth, that are normal to this type of social community places very special problems on a hospital school which are different in degree but not in kind from those of the school in any other community.

The problems encountered in the transfer of the cottage patients from the in-hospital school to the public schools were studied in detail, and some generalizations useful to any workers in the field who face the problems of entering institutionalized children into public schools were developed. In brief, three major issues were defined: 1) the decision as to when a child can begin to benefit from schooling outside the treatment institution, 2) the decisions that must be made around the planning for and selecting an appropriate school: and 3) the decisions about the quality and quantity of power and role distribution between school and institution to make it possible for the child to utilize the school experience. In connection with the first of these decisions, it was noted that the direction in which the child was moving was more important than his current situation at any given moment i.e., readiness for new experiences is often seen in potential ways by the amount of development the child has been able to make and the tendencies discernible in his overall adjustment rather than by how well he may do on any particular day within the institution. The obvious clinical issues, of course, must be considered, such as how he behaves, what he does in therapy, and how he handles community activities. In particular, the school record prior to admission must be analyzed for behavior crises and issues that occurred there. Attitudes toward the teacher are subjects for evaluation, as is the child's capacity to adjust to a new pupil group. Routines need to be weighed and the youngster's ability to adapt to them as well as the use he makes of ordinary school methods, all must be measured in sum. With this in mind, a simultaneous evaluation of school and child needs to be undertaken and a number of criteria were developed. Some of these were: the attitude of the staff of the school under consideration toward psychiatric treatment within that school; the nature of staff personalities who would be involved with the student; the physical plant of the school; its geographical location in terms of how hard it is to bring the child there or for the cottage staff to get there

in a hurry if necessary; the amount of crowding and nature of the session pattern at school; the relationship of that school to the child's family with special weight on previous contacts with parents or with siblings; the nature of the social structure of the school as compared to the social group of the child; the potentials for social groups within that school to become pathological; the age grouping of the children who are in the patient's grade, and the complexity of the school structure, e.g. junior highs. grade school, to which the youngster must return. The attitude of the principal was of prime importance, and some observation of the teaching methods and classroom manner of all the potential teachers in advance of allowing a child to contact them was considered a *sine qua non* for any possible success. All these factors are of the essence in the resolution of the third major issue, i.e., the arrangements between school and treatment institution. A very carefully tailored program was arranged for each child at school, with the appropriate courses worked out well in advance. One parent surrogate from the institution represented each child at the school. In addition an educationally sophisticated representative of the treatment institution kept in regular contact with the school in order to consult with teachers and principals. Opportunities were afforded for continued discussion of all issues; there were regularly scheduled institution-school conferences designed to discuss homework and community expectations. Special tutoring was also a feature of the work. Important contacts were made with student counselors in all schools and with the student disciplinarians in junior high school. Reports from school were obtained for inclusion in the institutional records, and planning conferences for grade placement the following year were initiated early in the year in order to facilitate the patient's promotion with a minimum amount of stress and strain.

6. Behavioral measurement and assessment of change.

A continuing group of studies had been devoted to surveying the social interactions of the cottage boys and many codeable observations were made on how they related themselves to others and how others related to them. In an earlier study, the interpersonal behavior had been observed at two periods a year and a half apart and the changes over these periods were examined. Two studies on this data were completed in 1959. In one the influence of various social settings on the interpersonal behaviors was explored, and it was established that knowledge of the social setting increased the variations in the types of behaviors observed on the part of the boys. What was not anticipated, however, was that the interactive effect between the child and the settings revealed much more

information about the youngsters' behavior than did the sum of all the independent components of behavior that were observed separately. It was concluded that the behavior evoked by a particular setting was related more to the personality of the particular child than to any other single factor. As they grew older and continued in treatment, the children's ability to make differentiations and variations in social behavior increased, this being dependent upon the nature of the setting. One of the important implications of this for further research is that it seems likely that observers would differ somewhat in their estimate of improvement depending on their locales of observation. In order for such an entity as improvement to be studied adequately there would have to be a representative sampling of a variety of situations in which the behaviors took place.

The second major study compared the social behavior of the patients at the two phases at which they were observed with that of two groups of well adjusted children who acted as controls. These control normals lived for brief periods in the same hospital ward as the patients and were observed in identical situations. Thus, with age and situation controlled, an attempt was made to decide whether the changes that occurred in the patients were due to the effectiveness of the treatment program or rather to maturation. It was found that a certain increase in appropriateness of social response observed in the disturbed children's peer relations did seem to be related to treatment rather than to age changes. In terms of their behavior toward adults, the children tended more and more to approach that of the normal controls. These favorable changes were also judged attributable to treatment. On the other hand, the disturbed children who had shown less overt dependent behavior toward adults when they were younger, came to exhibit increasing dependency toward adults as they matured. Since normal youngsters tended to become more independent as they matured, this too was viewed as a direct effect of treatment. It was concluded that the forces for change in social behavior are derived from adults rather than from other sources. Normal children tended to differentiate among social settings more than did the disturbed children, and their behavior was more predictable.

In general, both the normal and the disturbed children showed the same behavioral tendencies toward specific settings whether it was meal-time or play. The relationships between the behavior evoked by a particular setting and the personality of a particular child was a constant for the normals as it was for the disturbed children. This in a sense was the concluding

work in this whole skein of observations on the interactions of children and adults within the treatment settings. The use of the normal controls enabled the investigators to establish more definitively both methods of observations as well as an evolution of the meanings of improvement for these youngsters.

A derivative study that emerged from the observations made on the control normals had implications for a psychodynamic behavior theory. Normal ego growth was seen as something more than an absence of pathology but rather as a series of positive achievements meriting descriptive formulation, and, in time, genetic investigation. Such elements as the development of time perspective, the sense of trust in the future, the sense of objectivity (i.e. detachment from narcissistic equation of self and object) the ability to delay, the tolerance for frustration, the realistic perception of cause and effect, the capacity for initiative and taking responsibility, the search for mastery, and the sense of self-esteem were categorized as areas for observation and measurement. A number of achievements of the normal latency child were observed and comments were made on the reflections of ego growth in the use of speech, in the development of peer relations and ego controls, and in the techniques employed by such boys to control their own impulses and to advance support to each other in the face of tempting and exciting situations.

Studies of improvement were also undertaken. One investigator recorded the comments and observations of various staff members about the state of each of the residence patients at 6 months prior to the move from ward to cottage, and then again 6 months after the move. In tabulating this information five areas of improvement emerged. The first lay in the extension of ego horizons of the patients, so that totally new areas of functioning came into view. The second was the use of withdrawal as a healthy coping device in contrast to the acting out impulses behavior of the past--it was an interesting phenomenon that what in normals might have been considered pathological behavior, with these patients was used in the service of increasing mental health. Third, there were shifts in balance between individual--and group-centeredness; instead of the youngsters banding together and operating like a gang who are being oppressed and must resist the adults, each one began to individualize, differentiate and seek his own goals, and to express his own needs quite apart from those of the others. Fourth, there were changes in sensitivity to danger potentials; the youngsters became aware of problems earlier, and recognized and responded to each others recognition of them more quickly and subtly. And finally there was a development of a concept of self in such areas as sense of responsibility, pride, identity, humor, objectivity and sense of time which marked the progress of each of the youngsters.

A second study on improvement sought to evaluate the meaning of the term, to measure the impact on the staff of the phenomena of improvement, and to record some of the resistences and anxieties as well as the downright opposition that developed to the changes that were taking place in the patients. This latter was called the phenomenon of "improvement panic." It occurred when a staff which had been geared to coping with and responding to the most seriously disturbed behavior began to find that they were in fact encountering less disorganized and explosive situations than previously. As a result, such normal staff activities as recording and discussion showed up markedly; there seemed to be nothing to write and nothing to say about the less pathological patients. There was an increase in covert interdisciplinary tension, much argument about whether the patients were really getting better or whether this was just a naive, over-optimistic statement, and violent rejection of any attempt to observe the possible improvement at all closely. This was carried to the proportions of outright anger at the entire project together with a nostalgia for the "good old D-ys," when things had been "different" and very difficult. The narcissistic investment in the child's pathology, the feeling of being needed by him, the awareness of one's own errors that a study of his improvement might reveal were among the factors that appeared to be operative. Even the term improvement itself had many meanings. It might mean a change in over-all mental health; it might mean alteration in the individual functioning of the person as a human being; it might mean an alteration in the ease with which one could live with a patient; it might simply mean an abstract function with no particular connection with behavior. In any case, the impact on the staff was painful, and sometimes more painful on the more sophisticated than on the less thoroughly trained members of the team. Of particular concern was the question of whether of not a given "bit" of improvement was "real" or whether it was merely a defense against treatment. Moreover, even if present in any one field, was it ready for transfer to other areas? Again, the question was raised as to whether improvement meant that the child would not break down again; or whether the bases on which the progress rested were "genuine?" Some of the clinical changes that occur in patients when they start to improve were reviewed as well as some of the additional problems they might have to face; e.g., in coping with newer and more difficult situations, there would be greater anxiety about failure and about loss of control. The many problems the youngsters encounter with their peers, once they begin to improve, and their sensitivity to adult reactions, with the consequent use of their newfound abilities as bargaining and manipulative tactics also alter the acceptibility of and the

staff response to their improvement. To improve means to have more choices than before, which is in itself a source of turmoil-- particularly if the adults now begin to leave the youngsters on their own more, and thus implicitly demand more of them. Inevitably the patients make some wrong decisions and must face the consequences of these. The clinical staff must cope constantly with the temptation of over-expect and over-exploit the improvement and to make quick deals, so to speak, with a child whose improvement is really more of a mask and a defense than it is a genuine growth. The youngsters should not be made to feel that the response to their improvement is a reward for having been "good" or a privilege they have been granted. Without being indifferent to their growth, one tries to communicate to them that the improvement is something that is accepted just as growing taller would be. It is readiness rather than privilege that is the criterion for providing new opportunities. On their side, staff members have difficulty with their own desire to gloat over the successes. Rivalry may develop among the various "fields" or disciplines and tends to be augmented by these changes i.e., who is responsible for the improvement and where is it seen best? There are some real dangers in this since the treatment atmosphere can be turned into a reward and punishment type structure, and a system of caste develops with the necessary outcasts. This may emerge all too readily around the fact that some children are improving and other children are not. At the same time, the need for a more complex program emerges so that the varying achievement levels of all the children can be met instead of some being gratified and some deprived. In the face of these difficulties it is often difficult to decide whether a particular upset means that a child is regressing, or whether he is merely experiencing the pangs of trying to cope with a necessary new experience. One must, therefore, take calculated risks and be ready to accept the public reaction to the inevitable failures that will ensue. This study casts considerable doubt on the value of any type of intensity scale of skills, traits or personality characteristics measures of improvement. A serious weakness in our current descriptions is that the language depicting the psychological ingredients of settings and situations is very weak compared to the language we have to describe the changes in behavior itself.

1. The biographical studies.

The major area of dedication of the final year's work of the Child Research Branch lies in a series of six biographies, one for each of the residence patients, which are currently engaging the energy and the attention of the senior research staff. It is expected that these biographies will eventually be brought together into a single volume which will be a formal

statement of the lives and of some of the clinical thinking that went into the treatment of each of these boys. A second major study now under way is the definitive writing up of the material on life space interview. Here we will attempt to summarize all of the various experiences we have had with the modality of treatment, to categorize types of life space interview, to relate this interview to the therapeutic interview, and to explore the differences between the earlier style of life space interview initiated with the long term group and the later style developed on the ward with the eight younger patients.

One investigator is making an intensive examination of the learning problem of one of the long term patients, will attempt to relate this to the youngster's psychopathology. He hopes to correlate the learning difficulties as they were encountered day-by-day in the classroom with the psychotherapy hours and the content and the style of adjustment in the therapy. It is difficult at this point to predict exactly what will emerge from so careful a study with the large amount of data available--certainly the oft-discussed question of the interaction between psychopathology and learning difficulty should receive a searching and thoroughly documented explication.

A handbook on residential treatment based on cumulative experiences here is being outlined. It will review some of the broader outlines of treatment methods within a residence, the philosophy of treatment, the techniques, the problems, diagnostic issues, staff training, and some of the difficulties and attempted solutions that have emerged in the course of the interactions.

A number of less ambitious projects are also in prospect. Several of the boys have sustained losses of important relatives during their time in residence, and the record of their reactions is being assembled in order to study something about the meaning of such a loss to this type of child with particular emphasis on the forms of expression of this reaction throughout the totality of the child's life.

In reviewing the way some of our patients came to us, and some of the things that happened to their families, both before and during the course of their treatment, one of our staff was impressed by the way that the values of the mental health personnel who handled these families and patients, at one point or another became entangled with the issue of the management and treatment of the patients. It is anticipated that a report of these observations will be presented, and that they will prove useful to social agencies in dealing with disturbed families.

Another book in prospect is the history of the educational aspect of the project i.e., the record of the total experience in attempting to establish the school, the changes in method, the philosophy, and a thorough re-working of the meaning of the educational issues within the total undertaking.

Yet another report is being devoted to a history of the project as a whole with a careful examination of its origin, many of the events that have played a role in it, the administrative issues involved in its structure, the many clinical events that determined its form, with particular emphasis on the theoretical implications of the development of this type of social structure within a larger institution.

Laboratory of Clinical Science
Seymour S. Kety, M.D., Chief

The Laboratory of Clinical Science was established to straddle what might have become a gap between the basic disciplines, especially the biological fields of biochemistry, physiology and pharmacology, and the problems of psychiatric disease. Its division into basic and clinical sections represented the stake which each of these programs has in the functions of the laboratory, but, although the scientific work has represented a broad spectrum of activity from studies on patients with psychiatric disorder, on normal volunteers or on non-clinical and rather basic problems, there is no precise relationship of the scientific activities to the administrative division. In fact, the extent to which the clinical-basic division is not clear represents the success which the laboratory has had in breaking down the conceptual barriers which often separate these two approaches. For purposes of this summary, the work of the laboratory in the past year may be divided into certain problem areas: schizophrenia, ageing, experimental allergic encephalomyelitis, sleep, and specific problems of metabolism related to the nervous system or behavior.

Schizophrenia

The laboratory has continued its major program of investigation into the possible role of biological factors in the etiology and pathogenesis of schizophrenia and their interaction with social and psychological factors. The broad survey which the Section on Psychiatry had previously made of the family histories of male patients diagnosed as schizophrenic in the public hospitals of Maryland and the District of Columbia in the process of selecting patients for participation in the studies of the laboratory, provided an opportunity for an analysis of Drs. Pollin and his associates of the distribution of schizophrenia and other forms of mental illness in the families of schizophrenics. This revealed a preponderance of schizophrenia in the mothers, as opposed to the fathers, of such patients and was further supported by an extensive analysis of data in the literature. Although this appeared to support the sociologically based theories of the role of maternal influence in the development of schizophrenia, further analyses of alternative explanations revealed that the findings were compatible with a considerably greater marriage and fertility rate found among schizophrenic females in contrast to males.

The Section on Psychiatry is presently engaged in a careful study of the life situations of the selected group of patients under investigation by the Laboratory in comparison with their non-schizophrenic siblings in an effort to elucidate the special and perhaps highly individualized psychosocial factors operating before the development of the mental disorder.

Among the attractive hypotheses which are currently attempting to account for schizophrenia in biochemical terms, perhaps the most interesting is that based upon a postulated disorder in the metabolism of circulating epinephrine with the production of possibly psychotomimetic substances such as adrenochrome. By virtue of the recent excellent work of Dr. Axelrod in elucidating the normal pathways of metabolism of this hormone, the Laboratory was uniquely equipped to test that hypothesis. Szara, Axelrod and Perlin, more than a year ago, had ruled out the presence of abnormal or even detectable concentrations of adrenochrome in the blood of schizophrenic patients, and at the same time, McDonald and his associates had demonstrated that the reported rapid *in vitro* oxidation of epinephrine by the serum of such patients was the result of a dietary deficiency of ascorbic acid. An extensive study of the metabolism and the physiological and psychological effects of epinephrine infused into a series of normal controls and schizophrenic patients was undertaken collaboratively by a number of investigators in the Laboratory. Dr. Mann has found that the over-all rate of metabolism of this hormone as judged by blood levels achieved and the rate of their decay was identical in the two groups, while Dr. LaBrosse has demonstrated that the pathways of metabolism and the metabolic products of epinephrine were the same in schizophrenics as in normal man. Studies by Dr. Cardon on the cardiovascular effects of infused epinephrine, by Dr. Sokoloff on the blood glucose response, and by Dr. Pollin on the mental effects tended to confirm the slight differences which had previously been reported. Although the latter findings indicate some differences in response which are being further studied, the metabolic studies leave little room for the possibility of the generalized disturbance in epinephrine metabolism in this disorder which had been postulated.

Because of suggested possibilities of a disturbance in histidine metabolism in schizophrenia, Dr. Brown in the Section on Biochemistry undertook a study of the urinary metabolites of the amino acid uniformly labeled with C^{14} . Although this study resulted in a number of significant basic findings which are discussed later, it revealed no differences between the normal and schizophrenic patterns.

There is no a priori reason to suspect that if a biochemical abnormality exists in some types of schizophrenia, it must be generalized. On the other hand, a number of cogent arguments point to the highly differentiated metabolism of the brain as more likely to harbor important chemical mediators of behavior, both normal and abnormal. The inaccessibility of the brain for investigation during life makes it necessary to devise indirect methods of approach to possible cerebral metabolic disorders in schizophrenic patients. Dr. Kopin has been developing highly original, double-labeling techniques which may be suitable for the study of the metabolic turnover of such substances as serotonin and norepinephrine and other amines in the human brain. Another approach is to produce certain mild alterations in the chemistry of the brain in man on the basis of biochemical theory or of changes shown to occur by direct analysis in animals and carefully to study the effect of these discrete chemical changes on mental function as determined by carefully controlled but intensive psychological and psychiatric evaluations. One such study, initiated in the past three months and participated in by a number of investigators of this and other laboratories employs the dietary or parenteral administration of certain known precursors of possibly psychoactive substances known to occur in the brain in conjunction with certain enzyme inhibitors which may retard their destruction. There has been an opportunity partially to test tryptophan, phenylalanine, histidine, glutamine, glycine and methionine with and without the possible potentiating effect of small doses of iproniazid in this situation. Certain behavioral changes have been observed and reproduced and these findings are being actively pursued.

The discovery and characterization of the significant metabolites of epinephrine and norepinephrine makes possible for the first time reliable measurement of the endogenous production of these important hormones, not only in schizophrenia but in a large variety of psychiatric states and situations. Dr. McDonald and Dr. LaBrosse and their associates have undertaken the development of simple and reliable methods for the quantification of 3-methoxy-4-hydroxymandelic acid and of metanephrine and normetanephrine, respectively, in the urine. A method for the first of these compounds has already been developed and is being applied in studies of schizophrenia and other mental states and the effects of certain psychoactive drugs.

New information on the properties of certain drugs which have been extensively used in schizophrenia has been obtained in the past year. Dr. Axelrod of the Section on Pharmacology has demonstrated that both chlorpromazine and reserpine speed the destruction of epinephrine in vivo, representing one of the rare biochemical effects thus far discovered which these two drugs with similar psychiatric effects have in common. Confirming this in man, Dr. McDonald has shown a sharp increase in the excretion of a major metabolite of the catecholamines following a single dose of reserpine. Dr. Kornetsky further replicated his finding of a differential effect of chlorpromazine on the standing blood pressure of normals and schizophrenic patients and plans to investigate the possible mechanisms of this action in his new position at Boston University.

The absence of specific biological criteria in schizophrenia is matched by the paucity of reliable objective psychometric indices of the disorder. Dr. Feinberg of the Section on Physiology has carried out a series of studies aimed at differentiating the mental impairment associated with schizophrenia from that associated with non-schizophrenic illnesses. He has succeeded in designing a psychological test on which the performance of acute schizophrenic subjects differs significantly from that of patients with organic mental syndrome. The test in question, a modification of Raven's Matrices, shows that the acute schizophrenic patients make many more unreasonable errors than do chronic schizophrenic patients or patients with organic mental syndrome. These results point the way to a more precise and objective characterization of the nature of cognitive impairment in schizophrenia. The Section on Psychiatry is continuing its work on the development and testing of new methodologies which may provide data which are both clinically and psychodynamically meaningful and at the same time, verifiable and quantifiable.

The manifestations of psychiatric illness more than any other group of diseases probably represent the interaction of a multitude of factors from the sociological as well as the biological spheres, and a single and sufficient cause for a process like schizophrenia is probably not to be expected. One of the real values of an intensive interdisciplinary study of a selected small sample of patients is the opportunity thus afforded for relating findings of one discipline to those of many others in the same patient. To take full advantage of this opportunity, the Laboratory with invaluable collaboration by Dr. Greenhouse of the Biometrics Branch, NIMH,

and by the computer facility of the NIH, has undertaken a program of data reduction and comparison which will make for the maximum utilization of the data obtained by the individual investigators and their intercorrelation with other information.

Ageing

Studies by Dr. Sokoloff and the Section on Cerebral Metabolism in over 50 normal elderly men, carefully selected for their relative freedom from the common degenerative diseases of old age and who were functioning competently in their communities were completed and analyzed in the past year as part of a large collaborative study in this Institute with several very cogent results. This series showed no reduction in cerebral circulation or cerebral oxygen consumption in comparison with healthy young men, indicating that the reduction in these functions usually found in less carefully selected patients is not a necessary concomitant of the aging process. In the presence of arteriosclerosis of varying degrees there is a decreased cerebral blood flow, a decrease in cerebral venous oxygen tension indicative of cerebral anoxia, and a somewhat smaller fall in oxygen utilization which appear to be correlated with the degree and duration of the arteriosclerosis and the psychological deficit, suggesting that one of the primary changes in the mental disorders associated in some individuals with aging is cerebral circulatory insufficiency and the resultant partial cerebral anoxia. Patients suffering from what is known as chronic brain syndrome showed a more marked decrease in cerebral oxygen consumption compatible with the thesis that this syndrome represents parenchymal damage in the last stages of progressive cerebral ischemia.

Drs. Butler and Perlin of the Section on Psychiatry have studied these patients from the psychiatric point of view. In addition to contributing the psychiatric component of the correlations mentioned above, their studies on the psychiatric aspects of the aging process have revealed the importance of the personal meaning of psychosocial changes in terms of the individual personality as compared with the nature or incidence of the stresses themselves. The psychological defense mechanisms utilized by the volunteers and patients were studied and described in terms of their adaptive or maladaptive consequences.

Experimental Allergic Encephalomyelitis

This experimental disorder, produced in guinea pigs by the subcutaneous injection of brain tissue with certain adjuvants, offers a useful model for the investigation of multiple sclerosis and other demyelinating or degenerative diseases. During the past year the Section on Biochemistry has continued its studies on the etiology and pathogenesis of this disease. Purification of a water soluble antigen continues to be of major importance in this project. Encouraging results have been obtained with chromatography on modified starch columns as a means of separating traces of inactive protein from the antigenic material.

Of considerable significance to both pathogenesis and treatment of the experimental disease are the immunologic results obtained with this purified antigenic fraction. All immunologic tests on the antigen (skin and corneal hypersensitivity, serum antibody reactions) have been negative. However, carefully controlled skin testing has led to the observation that the disease can be suppressed by intracutaneous injections of aqueous solutions of the active fraction after the initial injection. A study of the significant variables in suppression of the disease in this manner offers exciting possibilities with regard to therapy and prevention of related neurologic diseases in humans.

Sleep

This equally common and mysterious state is an important segment of normal mental function and has associated with it the phenomenon of dreaming with certain interesting parallels to schizophrenic thought processes. Ten years ago, Drs. Sokoloff and Kety and their associates had demonstrated that normal sleep was not associated with cerebral ischemia, anoxia, nor with the reduction in oxygen and energy utilization associated with coma and anesthesia, providing evidence that sleep consisted of a change in the patterns of activity in the brain rather than a change in their over-all intensity.

During the past year the electrophysiological work of Dr. Evarts and the Section on Physiology has been devoted to studies of the effects of sleep on the electrical activity of the brain. These studies have indicated that sleep has different effects on activity in the brain stem reticular formation as compared to the cerebral cortex. These findings support and extend the theories of previous workers (Magoun and others) concerning the role of the reticular formation in the waking state.

During sleep, potentials evoked by clicks in the reticular formation are reduced, whereas cochlear nucleus and primary cortical potentials remain relatively unchanged. Recordings of single unit activity from the visual cortex show a considerable increase in total neuronal discharge during sleep as compared to the waking state. These microelectrode studies indicate that during waking there is a selective reduction of spontaneous neuronal discharge as compared to discharge evoked by primary afferent input (electrical stimulation of lateral geniculate radiations). This selective reduction of spontaneous neuronal discharge might be viewed as leading to an increase in the signal to noise ratio during waking. This notion involves the supposition that the spontaneous discharge is "noise" and the discharge evoked by afferent stimulation is "signal." Such a change in the pattern of neuronal discharge may be of importance in attention mechanisms associated with the waking state. Studies of evoked potentials recorded from scalp electrodes in man are to be carried out in order to determine the degree to which similar alterations of electrical activity may be found to be associated with sleep in man. These studies were made possible by an ingenious new technique for enhancing the signal to noise ratio in such recordings which was developed by Mr. Cox.

Dr. Cardon has continued his interest in the physiological and psychological effects of sleep deprivation. Subjects whose continuous performance is impaired show characteristic changes in heart rate, respiratory rate and depth, fingertip volume and pulse volume, and forearm volume pulse form. These changes occur in the course of the test when the subject is not responding to the visual or auditory cues presented, and disappear when the subject is responding. Thus, there seems to be abundant confirmation, at the physiological level, of the current hypothesis that much of the impairment of psychic functioning which accompanies sleep loss is due to "lapses" or "microsleeps."

Metabolism

Mechanism of action of thyroxine: A unique feature of the cerebral metabolism is its apparent lack of response to high circulating levels of thyroid hormone. An understanding of the basis of this unique behavior may reveal information concerning the metabolism of the brain in health and disease. The mechanism of action of thyroxine has been under investigation for many decades, but thus far a satisfactory explanation of how it increases metabolic rate,

stimulates metamorphosis and growth, or causes the many disturbances in body physiology and biochemistry in thyroid diseases has eluded investigators.

Dr. Sokoloff and the Section on Cerebral Metabolism have continued to make progress in their investigations of the mechanism of action of thyroxine. Their finding last year that L-thyroxine enhances the in vitro incorporation of amino acids into protein has been shown to be a definite stimulation and not a preservative effect. They have uncovered evidence of a latent period of action of thyroxine in vitro during which a still unidentified intermediate is formed which is then responsible for the stimulation. They have demonstrated that the formation of this intermediate is dependent on the presence of an active oxidative phosphorylating system. Their studies with the physiologically less active isomer, D-thyroxine, and the physiologically active analogue, L-triiodothyronine, indicate that the thyroxine effect on amino acid incorporation behaves in a manner to be expected of a physiological effect of thyroxine. They also suggest that D-thyroxine is physiologically inactive, not because the intracellular enzymes involved in the action of L-thyroxine are stereo-specific, but because it does not reach the enzyme sites when administered into the intact animal. Dr. Kaufman of the Laboratory of Cellular Pharmacology has been an active collaborator in many of these studies. The findings of this project represent encouraging progress toward the ultimate solution of the mechanism of action of the thyroid hormone.

Metabolism of epinephrine and norepinephrine: During the past year the Section on Pharmacology was mainly concerned with studies on the metabolism and physiological disposition of H³-epinephrine. In collaboration with Dr. Weil-Malherbe the distribution and rate of O-methylation of epinephrine was investigated. The amine was found to be unevenly distributed in various organ tissues and did not pass the blood-brain barrier except to a small extent in the hypothalamus. Within two minutes most of the administered catecholamine was O-methylated, while part of the hormone was bound by tissue constituent and retained in the body for long periods of time.

Dr. Axelrod, in collaboration with Drs. Kopin and Mann, reported a new metabolite of epinephrine and norepinephrine, 3-methoxy-4-hydroxyphenyl glycol. This compound was shown to arise from the deamination of (nor) metanephrine, followed by reduction. Subjects with pheochromocytomas excreted large amounts of the glycol.

Inhibitors for catechol-O-methyl transferase in vitro and in vivo have been found (pyrogallol and quercetin). Since other investigators have shown that these compounds prolong the action of epinephrine and sensitize the sympathetic nervous system, it would appear that catechol-O-methyl transferase is the enzyme chiefly concerned with terminating the action of the catecholamine hormones.

Using C^{14} and H^3 labeling of various precursors and intermediates in the metabolism of catecholamines, a technique is being developed by Dr. Kopin which enables estimation of the relative importance of alternate pathways of metabolism of one substance to an excreted metabolite, in a single experiment. The rate of metabolism of the precursor substance can also be estimated by study of the rate of change of the H^3/C^{14} ratio in the excreted compounds. The effect of various drugs on the routes of metabolism of the catecholamines and on their rate of metabolism is being studied. Using this technique an estimate of the importance of the pathways of epinephrine metabolism in man has been made. About 2/3 of an injected dose of epinephrine undergoes methylation while the rest is either excreted as such or acted upon by monoamine oxidase. About half of the 3-methoxy-4-hydroxyphenyl glycol and 3-methoxy-4-hydroxymandelic acid formed from injected epinephrine is formed by methylation followed by deamination. In the rat, methylation is of lesser importance, but is still a major pathway of metabolism.

Metabolism of histidine: Incidentally to his studies on the metabolism of this amino acid in schizophrenic patients, Dr. Brown of the Section on Biochemistry made a number of contributions relating to the normal metabolism of histidine which dwarfed the initiating study in their significance. An unstable metabolic intermediate (imidazolone propionic acid), whose existence was postulated but which had not hitherto been isolated, has been stabilized and characterized in collaboration with Dr. Moss, and a new metabolite present in the urine of man and other species has been identified (hydantoin propionic acid). In collaboration with Dr. Axelrod, a new methylating enzyme has been demonstrated and partly characterized as N-methyl transferase, which catalyzes the transfer of CH_3 - from S-adenosylmethionine to the imidazole ring of histamine. The presence of this enzyme in highest concentrations in the brain suggests the possibility of a significant function for histamine or some related amine in central nervous functions.

Metabolism of other amino acids: Because of the relationship to certain amines which may play a central role in the mediation of particular types of behavior or emotion, a number of amino acids are of special interest to psychiatry. Studies by Drs. LaBrosse, Kopin and Hotta are under way on certain aspects of the metabolism of tryptophan, phenylalanine, glutamine, methionine and tyrosine in an effort to relate the differential aspects of their metabolism to mental and behavioral state, to dietary intake or to the action of certain psychopharmacologic agents which may operate by an effect on such pathways.

Enzymatic Activities in Blood

Dr. McDonald in collaboration with Dr. Felsenfeld has been concerned with studies on the chemistry of ceruloplasmin. This approach comes as a logical development of previous studies in his Section on the possible role of ceruloplasmin in mental disease. In the current studies of ceruloplasmin it has been shown that copper exists in both the oxidized and reduced state. Furthermore, when ceruloplasmin is actively functioning as an oxidase, there is an increase in the amount of reduced copper present in the molecule. Other aspects of the chemistry of ceruloplasmin are presently under investigation.

A second area of study has been by Dr. Evans of the Section on Medicine concerning serum cholinesterase. In this study the effects of psychotomimetic and psychotropic drugs on two forms of human serum cholinesterase have been investigated. The difference in the responsiveness of the two forms of enzyme to inhibition by the psychotomimetic drug, lysergic acid diethylamide, was found to deviate from the pattern usually seen, suggesting a different mode of reaction. In addition, as apparently new deviant form of cholinesterase was discovered in a screening of mental hospital patients, although there is no reason to believe that its presence is related to mental disease.

Laboratory of Psychology
David Shakow, Ph.D., Chief

Since the introductory section of last year's report discussed at some length the general pattern of the ongoing and projected program of this combined Laboratory, I shall keep my introductory remarks brief this year. The six major areas of research remain the same: the psychophysical parameter, aging, child development, creativity, psychotherapy, and schizophrenia. The progress of research in these areas, as well as in some other areas, are well described in the reports of the several sections.

An encouraging development in our personnel program during the past year has been the increasing participation of post-doctoral fellows. At the present time we have seven such fellows - six American and one Polish. They are working effectively in the Sections of Animal Behavior, Perception and Learning, Child Development, and that of the Chief. In addition, Dr. Daniel C. Berlyne, a well-known English psychologist, is spending a year with our Laboratory as a Visiting Scientist.

The reports of the several Clinical Investigations sections are presented in this order: Child Development, Personality, and Section of the Chief.

Section on Child Development:

The program of research in this Section is a continuation of that which has been in progress for several years. That is, it is concerned primarily with studying the characteristics of the infant under one year of age, and with those aspects of his environment that are likely to be significant in their effect on the infant's development and the formation of personality characteristics.

Several current theories of personality development and of the etiology of mental pathologies, as well as of normal variations in personality and in other aspects of mental functioning, have emphasized the importance of the infant's early experiences. We hear of the devastating effects of maternal deprivation and of environmental impoverishment, of such things as hostile rejection and of over-protection of the child by his mother; we hear of the conditions which foster in the child feelings of security or insecurity, and of the effects of the child's early emotions and experiences on the course of his development. It becomes important, therefore, to explore in some detail just what is meant by these rather vague generalizations: specifically, what behaviors and conditions does the infant in different settings experience, and just how does he react to them? How lasting are the effects of early experiences and how persistent are behaviors and response-tendencies that are learned (or at least manifested) in infancy? Can we determine which behaviors are species-specific, or within species genetically determined, and the differential effects of given experiences on children who are differently constituted?

The studies take several forms, as they approach a number of the different facets of these indicated conditions in the immature, developing organism as it interacts with different features in the environment. Within this framework the nature of our investigations is determined to a considerable extent by the specific interests and preoccupations of the research psychologists involved.

One of Dr. Rheingold's approaches has been the comparative aspect of mother-infant interaction. She has so far made observations of maternal behavior and infant's response in several mammalian species of widely differing degrees of complexity: the hamster, the dog, the monkey and the human. In these comparisons she will seek to differentiate aspects of maternal behavior specific to humans and those general across species.

In the human infant Dr. Rheingold has studied three-month-old infants in two widely different environments: first-born children in middle-class homes, and infants in an institution. She finds the same kinds of caretaking occurring in both environments, but great differences in amounts of these: the home baby has much more care, and care primarily by one person, whereas the institution baby is

Section on Child Development (Cont'd)

left more to itself, but is cared for by many different people. At three months of age the behavior of the two groups of babies is about the same in many areas. The institution infants, however, proved to be more socially responsive to the examiner than the home infants. Subsequent research will attempt to uncover the causes of this difference. For example, were the institution infants more sociable because they were more deprived of stimulation, or because they did not discriminate the examiner as a strange person?

Other studies of Dr. Rheingold's are relevant in working toward answers to these questions. These studies are in infants' learning. She has, for example, shown that three-month-old institution babies quickly learn to vocalize more frequently when their vocalizations are rewarded regularly by a smiling social response of an adult. As a result of these research efforts Dr. Rheingold has developed some hypotheses about the genesis of social responsiveness and emotional attachment in the human infant. At a very early age there are already developed in him both a responsiveness to stimuli in the environment and a searching of the environment for stimulation. The sight of some objects in his environment bring about smiles and vocalizations and other signs of delight. Of all the objects which arouse these responses the most potent appears to be the social object, that is, another human being. More than any other object the other human being brings to the child not only complex stimulation, but also stimulus change, and especially stimulation in response to the infant's own behavior. Because of the large role of vision in these interactions, Dr. Rheingold proposes the thesis that human sociability develops primarily from visual but also to some extent manipulatory exploratory behavior.

Dr. Gewirtz is also interested in the acquisition of social motives and attachments by the human infant. He believes that a large variety of stimuli can function as unconditioned positive reinforcers of the infant's attachment behavior, in addition to those which meet the organic needs of the infant, and that reinforcing stimuli are likely to be provided also by non-human as well as human environmental changes. He plans to test these hypotheses by the technique of operant conditioning, and has been developing an apparatus that is suitable for use with infants, to provide stimuli and record responses and thus measure the processes of conditioning. He plans to continue these studies while in Israel.

Another facet of the study of early personality development is that of variations in maternal behavior. It is evident that normally a predominant part of the infant's environment is furnished by the mother. Therefore, her predispositions, expressed

Section on Child Development (Cont'd)

attitudes and behavioral habits in regard to her infant may have a strong influence on the kinds of response habits the infant develops. Certain types of maternal behavior have been given prominence in theories of the causes of, or at least strong causal components in, schizophrenia. Dr. Schaefer has been working on a series of rating devices for use in classifying maternal attitudes and behaviors. His current scales and hypotheses are outgrowths of the Parental Attitude Research Instrument and the Maternal Behavior Research Instrument scales that he and Dr. Bell developed, and which have been described previously. In statistical analyses of the maternal behavior scales, Dr. Schaefer has found two factors and also a Guttman type of circular order of neighboring that fit, not only the data from the Berkeley Growth Study, on which the scale was devised, but also a large number of other published data on maternal behaviors. The two main orthogonal dimensions (i.e., factors) in this circumplex are autonomy-control and love-hostility. He has used this model, and the descriptions of maternal behaviors in the Berkeley study as a basis for constructing a short-form Maternal Behavior Rating Scale and a Maternal Personality Rating Scale that can be used in evaluating the mother-child interactions as seen during a standard developmental testing situation. These scales are now in the process of being tried out, will be tested for reliability and validity, and revised on the basis of these preliminary trials. The relationship of these rated maternal variables will then be used to test out some hypotheses on mother-child relationships that Dr. Schaefer and Dr. Bayley have derived from the analyses of the Berkeley Growth Study data. For example, they found there some evidence that the lower class mothers of boys were more punitive and authoritarian than the upper class mothers, and that these relations in the mothers of girls were much less clear. There is also some evidence that the children of punitive, hostile mothers are more active and score higher on the developmental scales in the first year or two, but become less active and make poorer scores as they grow older. The happier, less excitable, inactive babies tend to be slow in their early development, and to have mothers who are more affectionate and generally accepting. There is also tentative evidence that the punitively controlling mothers have children who develop withdrawn, more maladaptive, kinds of social adjustment.

Dr. Bell has conducted a series of researches based on evidence that the mother-child processes of interaction, and the resultant maternal behavior and infant personality characteristics grow out of individual differences in the child as well as in the mother. He has observed and recorded the behavior of three-day-old infants, each for a three-hour period with a standard set of stimuli. From a careful analysis of his data he has been able to

Section on Child Development (Cont'd)

derive 5 factors which differentiate newborn infants before they have had more than minimal experience with their mothers. These factors he has called: skeletal muscular strength, skin sensitivity (these two are negatively correlated with each other), level of arousal, depth of sleep and oral integration. In a further analysis of strength and skin sensitivity he finds both sex differences and within-sex variability in these factors. Males tend to be stronger, females more sensitive to skin stimulation. There appear, thus, to be genetic differences that are identifiable in the newborn infant. If these remain stable, they may well form a genetic basis for both individual and sex differences in personality variables.

In following through with the research into other aspects of maternal characteristics as they affect the child, Dr. Schaefer is now testing out a scale of psychosomatic symptoms and psychological reactions of women, before, during and after pregnancy, and the relations of the latter two to difficulty of labor. In another approach to parent-child relationships he is testing out a scale for measuring children's perceptions of their parents' attitudes. Preliminary analysis shows differences between normals, delinquents and schizophrenics in their perceptions.

The interaction of the infant with his environment is determined to an important extent by the characteristics of the infant himself. Some of these have already been mentioned, such as individual differences in sensitivity to stimuli, and there are also evidences of differences in vulnerability to stress. Furthermore, the degree of development in an infant is a limiting factor both in his perceptions of his environment and in his ability to cope with the stimuli to which he responds. It is therefore necessary to evaluate these factors in the studies of early personality and learning as they develop. With a view to improving the tools for these evaluations, Dr. Bayley is revising and standardizing her mental and motor scales of infant development. These scales are designed to extend from one month through 30 months of age. Another dimension which she is adding to the scales includes the appraisal of emotional and other reaction-tendencies that should prove useful as rough measures of the variables of sensitivity, vulnerability, and emotional tone, among others. At present, in cooperation with the NINDB collaborative projects, about half of the 1,500 standardization tests for the first 15 months have been completed. With the use of such scales it will become possible to study learning and environmental adjustments in infants in relation to their developmental and "personality" scores.

Section on Personality:

Program Developments: During the past year the policy of securing a more unified focus for the section has been further implemented. The section in the past has been involved in a wide range of unrelated projects including studies of drugs, ward milieu, group psychotherapy, family group therapy, etc. This arrangement proved to be increasingly unsatisfactory both to the research psychologists and to the ward research staffs. With the recent implementation of this principle, members of this section have been freed to pursue research of compelling interest to them.

It was decided that the section's interests in basic personality theory might be unified under a broad research program in the area of creativity. It was decided, however, that no effort would be made to impose this program on the current members of the section whose research interests could not readily be fitted into the creativity program. However, in filling the existing vacancies, efforts were made to secure personnel who were interested in and able to contribute to the creativity research. In line with this reasoning, Dr. Albert Caron and Dr. Daniel Berlyne (as Visiting Scientist) have joined the staff to participate in the development of this research program. Since both Dr. Berlyne and Dr. Caron entered on duty only a few weeks before this report was prepared, a definitive statement regarding the creativity program must be deferred.

Areas of Research: Psychotherapy. The conduct and investigation of the process of psychotherapy continues to be one of the most fruitful sources of hypotheses for members of this section. This is illustrated in the work of Dr. Boomer. He and Dr. Goodrich have recently completed their replication of George Mahl's study of the relationship between instances of speech disturbances and global judgments on patients' anxiety level. Clinical material for this study was derived from tape recordings of psychotherapy sessions conducted by Drs. Boomer, Goodrich and Handlon. Dr. Boomer and Dr. Handlon each have two patients in treatment for purposes of this study as well as to further enhance their clinical skills. It was found that 1) the appropriateness of the speech disturbance index as a general measure of anxiety for all subjects is doubtful; 2) the therapist appears to be the best judge of anxiety in those patients who react to stress with some form of speech disruption; and 3) the reliability between judges concerning the identification of high and low anxiety phases is very poor.

The significance of this research lies not only in the fact that the investigators have provided a more sophisticated analysis of the speech disturbance instrument, but that it has raised basic questions regarding the conceptualization of anxiety and its

Section on Personality (Cont'd)

expression. Dr. Boomer now intends to test out some of his clinically derived hypotheses in the laboratory. He will attempt, under controlled conditions, to extend the investigation of tension indicators to include not only speech disturbances but other measures of autonomic lability. Issues of preferred modalities and the interrelationships among modalities under specified conditions will be investigated. Further study of the phenomena of brief inter-current speech pauses will be made to determine the part they play in what Mahl now defines as speech disturbances. It is to be noted that Dr. Goodrich's participation in this project has been reduced with his assumption of new administrative responsibilities.

Drs. Handlon and Parloff also have utilized their experience in group and individual therapy in their work concerning families of schizophrenics. This experience was relevant to the following activities: 1) The development of a test instrument devised to distinguish patterns of inter-family relationships which may correlate with mental health of the family members. 2) Dr. Handlon prepared a paper in which he derived and organized assumptions and hypotheses implicit in existing theories of schizophrenia. This paper makes clear the implications for research strategy of the various concepts currently in vogue regarding schizophrenia. 3) Dr. Parloff was co-author of a paper read at the American Psychiatric Association concerning recent experience with family group therapy. 4) Drs. Handlon and Parloff are currently preparing a paper to be delivered at the annual meeting of the American Group Psychotherapy Association contrasting group therapy and family group therapy.

Stress: Dr. Handlon currently devotes approximately one-half of his time in collaboration with the Section on Psychosomatic Medicine in the Adult Psychiatry Branch. He has continued his survey of literature reporting responses to psychological tests by individuals suffering from typical psychosomatic diseases. Dr. Handlon has taken an increasingly active role in the research entitled, "Relation of Emotional Behavior and Adrenal Function." He has participated in the planning and execution of a study which involves observing changes in emotional state in response to three critical situations: 1) adaptation to a new environment (Clinical Center); 2) spontaneously occurring events of personal significance in the life of each subject; and 3) standard commercial films that effectively present common human problems. Dr. Handlon's assessment of emotional changes includes: 1) conduct of personal interviews; 2) devising and scoring self-rating questionnaires filled out by each subject; and 3) the administration and interpretation of standard projective tests. Two of the most significant findings to date related to the work of Dr. Handlon are the following: 1) the identification of two Rorschach patterns that correlate with two

Section on Personality (Cont'd)

patterns of endocrine responses; 2) an analysis of the affect scales (self-rating questionnaires) for each individual patient over an extended period permitted the identification of individual affective response patterns to specified situational stresses. The technique of analyzing the self-rating questionnaire also assisted the investigators in focusing their interviews and ward observations.

Creativity: As has been previously indicated, any attempt to describe an integrated program of research in this area would be premature. In general, the ultimate aim of the research will be to describe the conditions, internal and external, which are necessary and sufficient for creative thought. Our more immediate aim will be to learn about basic psychological processes involved in creative thinking. One of the basic assumptions made in the work thus far is that the process is qualitatively the same at all levels of creative thinking and therefore can be studied not only in individuals designated as "creative" by their peers but also by working with talented subjects not so designated. It is the intention to attack the problem from two directions: 1) To undertake intensive clinical investigations with a) scientists who have been designated as "creative", and b) individuals who have demonstrated talent but as yet have failed to be judged as creative. Hopefully this will provide hypotheses for experimental study. 2) To select for intensive study basic psychological processes believed relevant to creative thinking.

To date this section has undertaken four approaches to the investigation of creativity:

1) The testing and interviewing of talented individuals. The sample has included Research Associates selected for the NIH training program. Efforts have been made to integrate the current testing program with that of Dr. Morris Stein in the hope that this will facilitate comparison and interpretation of the findings.

2) The testing of the hypothesis that intuitive thinking is a significant element in creative thought. To this end, an instrument for measuring "intuitive problem solving" has been devised and is currently being tested and improved.

3) An investigation of the hypothesis that problem solving may be enhanced under conditions of reduced inhibition. This is being conducted by use of the Kleitman technique of monitoring the dreams of individuals who have been given a problem-solving task which they failed to solve before retiring.

Section on Personality (Cont'd)

4) A pilot study has been conducted regarding the role of social influence factors involved in collaborative problem-solving. The variables included are a) degrees of respect for the opinion of others, and b) the degree of approval received from such individuals in the course of collaborative efforts to solve open-ended problems. Although the analysis of the data is as yet incomplete, there is evidence to suggest that (1) approval is an important condition in stimulating an individual to produce original and plausible ideas, and (2) the less accepting the individuals are of each other the greater the impact of receiving approval or criticism.

It is hoped that it will soon be possible to undertake the intensive psychoanalytic investigation of a highly gifted but as yet "uncreative" individual to provide clinical data and hypotheses relevant to this project.

Section of the Chief:

The major areas of research in this Section remain schizophrenia and psychotherapy. Another involves the psychological aspects of physical illness. In the area of psychotherapy there is some overlap with studies in the Section on Personality.

In addition to the Chief, the members of the Section who are concerned with the problem of schizophrenia are Drs. Rosenthal and Zahn. Dr. Lawlor of Fordham University and Dr. Rue Cromwell of Peabody College were associated with us on this program during the summer. One continuing study by Dr. Shakow involves the analysis of a large body of already existing experimental data on the psychology of schizophrenia as a basis for the development of theory in this field. During the year further progress was made on the analysis of this material. A paper on discrimination reaction time and a paper on the tautophone are among the many studies in an advanced degree of analysis. It is hoped that eventually this work will result in several monographs on the psychology of schizophrenia.

Besides the above, studies in schizophrenia carried out during the year fell into three areas: heredity, psychophysiological responsivity, and simple adaptive behavior (reaction time).

In the area of heredity, Dr. Rosenthal attempts to deal with the relative contributions of heredity and life experience factors to the severity and forms of expression of schizophrenia. To deal with this problem he has carefully analyzed the relevant literature in this area and has marshalled strong evidence for the following points:

There is a group of schizophrenics in which heredity factors probably play a strong part. In males, the form of the illness is mainly catatonic and the illness is severe. There is a group of schizophrenics in which hereditary factors play a minimal part or none at all. In males, the form of the illness is mainly paranoid and the illness is relatively mild in that onset is late and outcomes non-deteriorating. In the major twin studies of schizophrenia, chronic patients have constituted the bulk of the large samples, a factor which tends to yield overestimates of concordance rates. In the major twin studies, there are differences between investigators with respect to sampling methods, determination of index cases, and diagnostic criteria. These findings, plus the probability that too many twins are classified as dizygotic who are probably monozygotic, suggest that the present estimates of concordance rates are not reliable. Differences in concordance rates between female and male pairs, and between same sex versus opposite sex pairs occur with respect to schizophrenia and mental illness generally when the relationship is in the nuclear family,

Section of the Chief (Cont'd)

but not when the relationship is avuncular. This finding provides strong support for psychological influences playing a significant role in the manifestation of schizophrenia.

Continuing experimentation went on in the area of psychophysiological responsivity as measured by GSR and heart rate reactions to repetitive presentations of simple stimuli. The purpose of these studies is to investigate the autonomic reactions of schizophrenics under conditions which are minimal both in the quality of the stimuli and in the demands put on the subject. By intragroup comparisons of these autonomic measures with measures of overt behavior assessed by both ratings and more objective means such as experimental tasks, and by intergroup comparisons of schizophrenics with normals on these measures, the attempts are to evaluate the contribution of differences in autonomic functioning or arousal to deficits in the behavior of schizophrenic patients. This minimal stimulus - minimal response situation is to serve as a "basal" condition for further studies in which the affective quality and/or demands on the subject will be increased.

Preliminary findings on the GSR data for 32 patients and 8 normals indicate that, with respect to normals, schizophrenic patients give about the same number of specific responses to 40 repeated presentations of an auditory or visual stimulus, but the normals start at a higher level and habituate more rapidly. In addition, the patients give more non-specific responses relative to specific responses, have a lower baseline resistance and give responses with less amplitude than do normals. Data on a previous sample of patients indicated a significant correlation between response frequency and "mental health" or "ego intactness". This was not replicated on the latest sample of patients, but "mental health" correlated negatively with baseline resistance and response magnitude. The data from the two samples indicate, therefore, lowered autonomic responsivity to external stimuli by patients with poorer "mental health" but each sample shows this via a different measure.

The studies of reaction time are being continued in a variety of settings and under various experimental conditions in order to answer some important theoretical questions about factors relating to this response.

A number of findings have come out of our most recent studies. These are: 1) Severity of schizophrenic disorganization is more reliably measured by any of three different methods than are other traits and behaviors of such patients, and this measure correlates highly with various aspects of their performance on tests and experiments. 2) When preparatory intervals (PI's) are administered

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in regular series, increasing in duration from 1 to 10 seconds, or decreasing from 10 to 1 second, normal S's do equally well under both conditions. Schizophrenic S's show poorer R T with longer PI's in the ascending series, but do poorly on all PI's in the descending series. 3) When PI's are administered irregularly, schizophrenic S's are more influenced by the previous PI than are normal S's, who are also influenced by it. 4) R T of schizophrenic S's is better when S is given a verbal "Ready" signal as compared to when PI's are programmed automatically. 5) If two relatively short PI's are administered irregularly so that the probability with which each PI occurs is predetermined, then for normal S's, R T for the shorter PI increases as its probability of occurrence decreases. 6) In a R T situation where S is permitted to select his own PI's and where he is not, normal S's prefer the "autonomous" condition where they select their own PI's, whereas schizophrenic S's prefer the "controlled" condition where the PI's are determined for them. 7) Preliminary findings suggest that normal S's have better R T's under the "autonomy" condition, whereas the R T's of schizophrenic S's are better under the "controlled" condition. 8) Normal S's who perceived their mothers as more protective tended to see events as externally controlled, but schizophrenic S's did not. But schizophrenic S's tended to see their mothers as more hostile than did normal S's.

In collaboration with the Clinical Science Laboratory the effects of various precursors of serotonin and of low dosages of Marsilid on autonomic responsivity, reaction time and ability to maintain a set are being studied in schizophrenic patients. The data are still being analyzed, but it is planned to relate changes in these measures produced by the drugs to changes in behavior as measured by ward ratings, interviews, and other experimental techniques as well as to biochemical changes.

In an attempt to explore some of the conditions influencing reaction time and the maintenance of sets in normals, a reaction time experiment was carried out on normals who had been deprived of sleep for 48-52 hours. The results showed that at the beginning of the half-hour session, if the preparatory interval was short and the subject could control the onset of the trial, there was no impairment. If any of these conditions were not met, sleep loss produced an impairment of reaction time.

Dr. Rosenthal has continued to carry the administrative responsibility for the general aspects of the scientific investigation of a group of identical quadruplet schizophrenic girls who have been under study by investigators from various laboratories for a period of several years. A large amount of data in different areas

Section of the Chief (Cont'd)

have been accumulated and considerable progress was made during this year in their collation and analysis. The integration, evaluation and write-up of these data have been begun by various investigators. The psychological material is in final stage of analysis by Drs. Rosen-thal and Parloff at the present time.

At the general theoretical level Dr. Shakow has revised the paper presented at national and international meetings: "The Re-corded Psychoanalytic Interview as an Objective Approach to Research in Psychoanalysis". This is an attempt to provide the general rationale for the approach used in the major project. As an out-growth of the research group's activity in the analysis of the first hour of the therapy, Dr. Shakow drew up a systematic account of modes of adaptation, particularly modes of defense, as they reveal themselves in the psychotherapeutic process.

Dr. Dittmann has continued his microanalytic studies of communication in the therapy process through the investigation of foot movements and speech disturbances. Two samples were collected and analyzed, the first finding association between foot movement and speech disturbance at the .01 level, the second finding no association. A third sample has been collected, and is now being analyzed for speech disturbance. The variability in movement from interview to interview is so great as to cast doubt on its usefulness beyond a characteristic of the interview as a whole: the spread is from 1 to 54 in 18 interviews so far studied. Thus while in those interviews with many movements, the occurrence of a movement may mean something about the events within the interview, interviews with very few movements may be best characterized as lacking in information, not lacking in the sort of disturbance we are interested in. It also is very clear that in later interviews there are more movements than in earlier ones, the first two samples having been selected within the first 40 interviews, and the third from 50 to 100. Work is now in progress sampling much later interviews for simple count of foot movements.

Dr. Dittmann together with an assistant has also been involved in the indexing of the interviews. About a dozen interviews have now been checked by them. This work is chiefly to develop a standard level of abstraction, but has the side purpose, of course, of amassing a list of topics and referents which may be categorized. The progress is such that after one or two more interviews the two will be able to index an interview independently and check agreement.

Another important facet of the work on psychotherapy is one with which Dr. Bergman is concerned. During recent years he has been

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gradually developing "A General Theory of Psychotherapy." He presented a short formulation of this theory at the annual meeting of the American Psychological Association this year and is now in the process of setting up the project for the clinical testing of the evolving hypotheses. Since counter-conditioning is a fundamental part of his theory, Dr. Bergman is at the same time planning a series of experiments in which the attempt will be made experimentally to counter-condition so-called "anxiety" stimuli.

Another area of research being carried on in the Section is Dr. Kendig's study of psychological factors related to physical disease in association with various of the other Institutes and with some outside agencies. Her major project is on the self-concept and body-image as related to disease susceptibility and organ choice. In this study she is exploring attitudinal factors insofar as they affect health and longevity. She is particularly interested in early childhood attitudes which may be instrumental in determining the nature of the self-concept and the body-image, especially in relation to susceptibility to illness, organ choice, course and outcome of disease. Dr. Kendig has developed an elaborate detailed questionnaire or interview schedule which is aimed at uncovering the attitudes towards the self and the body inculcated in early childhood, explicitly by direct instruction and implicitly by the emotional climate of the home and family reactions to illness. After pre-testing on two patient groups and one one group of normal controls, the scales have been drawn up so the data can be coded and treated quantitatively. The coding of the interview schedule which has already passed through a number of forms has been completed and a weighted scoring system devised. The two notable developments of the past year have been the extension of the project to include the study of a group of leukemia patients (NCI) and the selection and interviewing of a group of 'normal' controls. With the approval of the Medical Board, NIH personnel is drawn upon for the selection of the latter. The immediate goal is to complete the interviews. To achieve the desired n of 50 rheumatoid arthritics and 25 leukemia patients, 10 more subjects must be obtained in each group and patients continue to filter in slowly. About 50 more controls, carefully matched for age, race, sex, education, occupation and religion must also be selected and interviewed. Meanwhile arrangements have been made for the blind scoring of the protocols. As soon as the first 25 arthritics and their controls are scored, analysis of the data can begin, the 2nd 25 arthritic cases then serving as a replication of the first.

Section of the Chief (Cont'd)

Dr. Daniel E. Berlyne, here as a Visiting Scientist for a year, is assigned to this Section but actually involved in projects in several sections. He has only recently come so that his projects are in the planning or about-to-be-embarked-upon stage. They comprise the following: 1) The psychophysiological effects of conflict. Experiments would deal with these questions: a) the effects of conflict on autonomic measures; b) the effects of conflict on E.E.G. measures; c) the effect of number of competing response-tendencies on reaction-time; d) the effects of complexity and incongruity of visual stimuli on orienting responses and autonomic measures. 2) As part of the creativity project of the Section on Personality, Dr. Berlyne plans to do some experiments on motivational factors underlying creative thinking, especially on the role of conflict and uncertainty in intellectual (epistemic) curiosity. This may lead to work on aesthetic behaviour. 3) In association with Dr. Rheingold, Dr. Berlyne plans to work on the determinants of perceptual curiosity in human infants, especially the role of novelty and complexity.

Although not directly research activity, the service work which has been carried out by the Laboratory should be included in the report because of its indirect contribution to research and clinical work of other Laboratories and Institutes. Dr. Kendig has carried the burden of this work alone.

During the period since the last annual report, Dr. Kendig has examined 88 patients for various Institutes: Cancer, 21; Heart, 11; Allergy and Infectious Diseases, 10; Arthritis and Metabolic Diseases, 15; Neurological Diseases and Blindness, 18; Mental Health, 8; miscellaneous, 5. This averages out to about 8 patients a month, an increased load over last year. Since each consultation takes approximately eight hours on the average, it is clear that Dr. Kendig continues to spend about 1/3rd of her time on this activity. As pointed out last year, Dr. Kendig has found that these contacts with other Institutes have been valuable for her research. It is clear, however, that since Dr. Kendig retired this year and has only been reappointed for an additional year, another way will have to be found to handle this problem.

Laboratory of Socio-environmental Studies
John A. Clausen, Ph.D., Chief

The development of the Laboratory's program in 1959 has perhaps been most impressive in the area of family studies, both in the progress made in studies previously undertaken and in those more recently initiated. These researches touch upon such substantive problems as (a) the structuring of inter-personal relationships in selected samplings of normal families, (b) the influence of maternal employment upon the mother's attitudes and her performance of the maternal role, and (c) husband-wife communication and interaction in the period antecedent to the hospitalization of either spouse for mental illness, and upon such methodological problems as (d) the validity of retrospective data on early parent-child relationships and (e) the development of observational techniques to supplement and cross-validate interview techniques for the study of family relationships. This concentration of effort upon the description and analysis of family patterns (though by no means to the exclusion of other areas of research) is in part a reflection of the strategic importance of the family as the group through which broader social and cultural influences upon personality development and behavior are mediated, and in part a matter of phasing of the long range Laboratory program.

The ultimate goal of the Laboratory's program is to delineate and study the social norms and processes which (a) influence the development of personality and the distribution of mental health and illness, (b) affect the individual's ability to carry out normal family, occupational or community responsibilities and activities, and (c) govern the ways that disturbed or ill persons are perceived, defined and dealt with at various stages of the life history. Past research had indicated a number of significant correlations between grossly classified social-cultural phenomena and the phenomena of mental health and illness, but the specific linkages remain for the most part obscure. For example, rates of treated schizophrenia are inversely related to social status in the United States and Great Britain. Parent-child relationships exhibited by families which contain schizophrenic patients appear to differ from those of families with normal children; and family patterns also appear to differ by social status groups. But our knowledge of the distribution of such family patterns in the general population is meager, and knowledge of the specific effects upon personality development of various combinations of family patterns is almost non-existent. More systematic study and more adequate specification of what goes on in the normal family is necessary, then, as a prelude to more sophisticated investigation of the

epidemiology of mental illness. Hence, at the present stage of our knowledge, methodological studies and systematic analyses of the intercorrelated networks of variables that constitute family patterns seem especially strategic approaches to the pursuit of our long range goals.

Hand in hand with the description and analysis of social structure and interpersonal networks must go the development of more adequate theories of personality development. While the social scientist looks to the psychologist and the psychiatrist for aid in conceptualizing personality organization and dynamics, he has a special responsibility for analyzing and formulating the relationships between social structure and personality development. If certain combinations of relationships and experiences lead to distinct behavioral responses (delinquency, drug addiction, aggressive striving, etc.), linkages will require conceptualization of both the social-experiential input and the behavioral output.

Thus far the Laboratory's program has been focusing on the analysis of the "input" variables, and for some years our primary efforts are likely to continue here. It may be noted, however, that the research of Campbell and Yarrow on children's peer-group relationships, the new study by Burton on processes of internalization of standards and values in children, and Rosenberg's research on self-images in adolescence deal to a considerable degree with social behaviors and psychological processes on the "output" side.

Before turning to consideration of the specific projects under way in the several sections, it may be noted that during 1959 the Laboratory was fortunate in being able to recruit four well qualified younger social scientists representing a broad range of skills in social psychology, sociology and anthropology. Their research is still largely in process of formulation or early phases of data collection, but each man comes with broad research goals well envisioned.

The report of the Clinical Investigations section follows:

The work of this Section is devoted to the study of the social environment within which therapy takes place. Three general approaches are utilized in our mental hospital research: the broad sample survey method, represented by the work of Dr. Pearlin; the method of controlled experimentation, represented by the work of Dr. Schooler; and the method of participant observation and unstructured interviewing (akin to the anthropological method) represented by the work of Dr. Lschen.

The survey approach has been utilized by Drs. Pearlin and Rosenberg in their investigation of staff attitudes and behavior in a large mental hospital. While the evidence is clear in indicating that the mental patient's contact with nurses, psychiatric aides, and nursing assistants may have an important bearing upon the course and outcome of the mental illness, relatively little is known about the factors which contribute to the attitudes and behavior toward patients of nursing personnel on the ward. Hence, a questionnaire for nursing personnel has been developed which is designed to provide information about staff perceptions of patients, preferences for types of patients, methods used to influence patient actions, conceptions of causes of mental illness, sense of personal efficacy in treating patients, social distance or intimacy with patients, receptivity to change in hospital practices, belief in the efficacy of hospital treatment, attitudes toward authority relationships, salient problems in work, work satisfactions and dissatisfactions, and other information relating to a custodial or humanistic approach and to job morale. In addition, the questionnaire contains items on personal background and demographic characteristics, as well as certain simple personality measures. After three pre-tests (one involving a ten per cent probability sample of the hospital), the questionnaire was administered to the total nursing staff of Saint Elizabeths Hospital. One initial administration and three follow-ups yielded a return of 1138 questionnaires, representing 87 per cent of the nursing population. In addition, Ward Information surveys have been collected on all 156 wards in the hospital, and data are being collected on staff behavior patterns. The survey and ward information data have been processed and are now being subjected to statistical analysis. Throughout this study we have had the wholehearted cooperation and unqualified encouragement of the supervisory nursing personnel of Saint Elizabeths Hospital.

The method of controlled experimentation is represented by the work of Dr. Schooler. Dr. Schooler, who joined our staff in April, has come to us with training in experimental social psychology in the mental hospital gained at Montrose Veterans Hospital. Since his arrival, Dr. Schooler has initiated an experimental study of affiliative behavior among 60 chronic schizophrenics at Springfield State Hospital. Response to the experimental stimulus will be related to the patient's present intellectual and emotional functioning, as measured by the Wechsler Adult Intelligence Scale, the Rorschach, and a Word Association Test, and to his pre-morbid level of social adjustment, as determined by a study of his records.

Dr. Løchen, who joined our staff as a Visiting Scientist in July, used the methods of participant observation and unstructured interviewing with great effectiveness in his work at the Dikemark Mental Hospital in Oslo, Norway. He is interested in comparing

certain aspects of organizational structure in Norwegian and American mental hospitals. In his work in Norway, he observed that staff members performing different functions in the hospital often interpreted the success or failure of the introduction of new therapeutic programs differently. Dr. Löchen reasons that the likelihood that such therapeutic programs will be introduced into mental hospitals, or, if once introduced, will be effective, will depend upon how people occupying different functional positions in the hospital will interpret or react to these innovations. He plans to pursue this question in an American mental hospital.

The work of this Section includes not only the investigation of the social organization and functioning of the mental hospital, but also interdisciplinary research on a variety of mental health phenomena. In particular, Drs. Rosenberg and Pearlin have collaborated with several members of the Personality Development Section of the Adult Psychiatry branch on a study of how competent adolescents cope with the problems generated by the transition from the senior year of high school to the freshman year of college. The aim is to define those factors in the subject's early experiences, present personality structure, and current environment which are related to his methods of coping with stress during the period under study. Interviews with students and data analysis are being conducted by personnel from the field of psychiatry, psychology, psychiatric social work, and sociology.

Dr. Rosenberg has been engaged in a study of self-image and self-ideals in normal adolescence. He is studying the impact of cultural background, roles and statuses, family experiences, and unique experiences upon the adolescent's level of self-esteem, and attempting to determine the relationship of self-esteem to measures of tension, depression, and neuroticism. He is also concerned with learning about the impact of self-esteem upon interpersonal relationships and socially significant opinions, attitudes, and values. On the basis of preliminary studies with small samples, it has proved possible to develop reasonably satisfactory Guttman scales of the following dimensions: self-esteem, preoccupation with self, interpersonal inhibition, certainty of self-image, stability of self-image, imagination, and depression. In addition, questionnaire items dealing with a number of other relevant areas have been developed. The administration of this research instrument to a large sample of normal adolescents during the coming year is planned.

During the year the Section was host to Dr. Cyril Sofer, a Visiting Scientist from Tavistock Institute of Human Relations in England. Dr. Sofer visited with us for a period of three months. His broad experience and keen intelligence proved most helpful to us in the formulation and clarification of our research problems, and he applied his knowledge of group processes to Dr. Elkes' program at Saint Elizabeths Hospital.

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ANNUAL REPORT
COMMUNITY SERVICES BRANCH, NIMH
January 1, 1959 - December 31, 1959

INTRODUCTION

During 1959 the Community Services Branch prepared a comprehensive review of its program, accomplishments, and future goals for purposes of budget presentation as well as to project its planning on the basis of new developments and trends in the area of mental health. This review of the Branch program presented a valuable perspective in defining objectives and relating them to program planning.

The major job of the Community Services Branch is to improve, extend and strengthen State and local programs for the promotion of mental health, prevention of mental disorders, and the care, treatment and rehabilitation of the mentally ill.

The Branch serves as the major channel for mobilizing the resources of State and local mental health programs in achieving national mental health objectives. Through the operations of the Community Services Branch, and especially the regional mental health staff, it is possible for the National Institute of Mental Health to reach every community in the nation. The Branch provides a communication network for the dissemination of knowledge as it becomes available from basic and operational research. In the other direction, Branch staff serve as eyes and ears of the Institute. From continuous contact with staff in on-going State and local programs, Branch staff provide feedback to the National Institute of Mental Health on needs, problems, and areas requiring development in the research and training programs of the National Institute of Mental Health. Empirical findings from practice often serve as an essential first step which can be followed by more rigorous testing through formal research.

Many States are directing funds into research activities and need help and guidance in developing sound projects and methods; these research activities both supplement and complement the work being done by the research program of the NIMH.

Mental health programs cut across many areas of interpersonal relationship which do not lend themselves to communication through traditional public health channels. It is imperative that extensive consultation be provided to schools, welfare agencies, correctional agencies, family service agencies and many other community resources whose programs provide access to constructive work with people in need of help. Each of these services provide research settings and experience of great importance to the development of sound mental health concepts.

In order to carry out the objectives of the National Mental Health Act, three major resources are used by the Community Services Branch: (1) Professional and technical assistance, (2) Mental Health Project Grants, (3) Grants-in-aid to States.

Staff to administer the programs are employed at headquarters, regional offices, the Mental Health Study Center and three demonstration centers. Branch staff engage in a wide range of activities, including administration of grants, consultation to staff of State and local programs, surveys, field demonstrations and pilot projects, program analysis, and operational research.

In addition to overall administration of Branch activities, Professional and Technical Assistance provides expert consultation services to the States through personnel from the central and regional offices, through the use of career development personnel, and by the utilization of part-time consultants from outside the Public Health Service in special areas. Under this program the Branch carries on demonstrations and community studies utilizing PHS personnel to extend the frontiers of knowledge relative to mental health and to spread new or different methods of meeting mental health needs that have not been recognized or developed by States. Interstate Institutes are conducted in program development and administration to meet the inservice training needs of State level staffs. Technical Assistance Projects are sponsored which are focused on a particular mental health problem within a State, bringing together limited numbers of State personnel with outstanding experts to explore and develop new methods and techniques in an area of special concern.

The consultation program as carried out through central and regional office personnel provides the mechanism by which new knowledge is transmitted into operational programs and knowledge from programs is transmitted back to the NIMH and disseminated to other areas. In this regard it is significant to note that some of the most hopeful patterns of patient care in recent years have come from experimentation done in operational settings; these include such concepts as emergency psychiatric care, the therapeutic community, open hospitals, and day and night hospitals.

The Title V grants program is designed to improve hospital and community care, treatment, and rehabilitation of the mentally ill including improved methods of operation and administration of institutions. It pursues its goals not only by the support of studies that hope to add scientific knowledge to the field but also by the support of pilot projects and demonstrations, which will stimulate growth and interest in mental health; encourage rigid, deprived, or isolated systems to utilize progressive methods and therapeutic techniques; and develop better communication and coordination among existing agencies.

New concepts of care, treatment, and rehabilitation of the mentally ill stress continuity of care that begins in the community with programs designed to provide appropriate treatment for patients in the community when this is feasible such as outpatient services, emergency care, foster-home placement, day and night hospitals, and increased use of general hospitals for the treatment of psychiatric patients. When hospitalization is desirable new methods are being tried such as open wards, therapeutic communities, patient's clubs, and a variety of other treatment techniques that tend to result in briefer periods of hospital care. When patients return to the community a variety of facilities are essential to provide adequate

followup care such as clinical services, foster homes, half-way houses, vocational rehabilitation training and placement, nursing care, family counseling and other activities. An adequate program, therefore, includes a wide spectrum of services both community-based and hospital-oriented which must be integrated into a pattern that provides continuity of care for the appropriate treatment of the individual depending upon his particular needs.

These activities are being implemented through Title V grants and results are encouraging. The program is realistic and functional, and it is axiomatic that with an appropriate range of resources, hospitalization is not always necessary or desirable, and that when progressive programs are operative, hospitalization time can be decreased. The existence of a comprehensive range of services is only fragmentary in most areas and practically non-existent in many. In order to provide the opportunity to expand programs and try new techniques, help is needed through the Title V grant mechanism so that individual communities or hospitals can adapt these trends to meet their needs and to demonstrate their effectiveness. Knowledge about new programs and grant possibilities is just beginning to permeate into many areas, new projects are being stimulated, and the program is gaining impetus that is producing meaningful results.

The purpose of mental health grants in aid to States is to assist the States in establishing, extending, and strengthening mental health services, and to help in the development of a State-wide mental health program of community services. Until the National Mental Health Act of 1946 State activities tended to concentrate in hospital programs; the grants-in-aid for community mental health have provided stimulation for the development of community based programs.

The goal of the mental health program in the States is to have a State staff of high caliber that is representative of the various mental health disciplines and which can provide the leadership and stability necessary for the development of a wide spectrum of services for comprehensive mental health programs at the community level. In addition to the creation of skilled State level staff the grants-in-aid are utilized to establish basic community services, develop new and improved methods of program administration, conduct pilot projects and demonstrations in new areas of special emphasis, to evaluate and study on-going services, and to provide inservice training.

The past decade has seen many changes in programs concerned with mental illness. Among the significant trends are the increased rate of discharge from mental institutions, the utilization of short-term inpatient treatment in general hospitals, the demand for outpatient clinics and after-care services, and the emphasis on programs of prevention. These developments have placed the focus of programming at the community level and have necessitated a broadened base of local facilities. The stimulation resulting from grants-in-aid to the States has been a decisive force in bringing about these changes.

Despite the rapid growth and changes in program emphasis there are many States which do not have an adequate State level staff and where programs are not using the increased knowledge available in the mental health field. Progress that has been made since the passage of the National Mental Health Act has resulted in the development of some State level staff in all States and Territories. With the increase in training activity, well equipped personnel will be more available to provide State leadership.

As a result of the new knowledge being developed through research it is essential that this knowledge receive testing through demonstration and pilot projects, and be revised and modified to meet the needs of different localities. As its effectiveness is demonstrated it should become an integral part of State programs so that the ultimate consumer benefits from the new knowledge and techniques developed through research. It is in the State and local programs that this knowledge can accomplish significant results and it is through the grants-in-aid structure that this progress can be stimulated. The grants-in-aid program gives ready access to every State and every community in the States to promote this logical progression of new knowledge from the laboratory to the consumer.

Among the encouraging factors that indicate progress toward the objectives of the Community Services Branch, the following seem most significant:

1. There is a Mental Health Authority in each State responsible for State planning and program development and authorized to accept and utilize grant-in-aid funds on the basis of an annual plan submitted to the Public Health Service for approval.

2. There has been a significant increase in the number of community clinics indicative of the trend to provide services in the local communities when appropriate to the needs of the individual.

3. There has been increasing coordination of community services and hospital programs to provide continuity of services directed toward better screening, improved care, treatment and rehabilitation, and more effective after-care of patients.

4. There has been a substantial increase in the number of skilled personnel in the mental health disciplines working in State and community programs.

5. There has been a remarkable increase in State appropriations for community mental health services.

6. Increased emphasis in State programs is being placed on training and research activities.

7. Psychiatric units in general hospitals have increased.

8. New programs utilizing a variety of facilities and new concepts of treatment such as day hospitals, night hospitals, emergency psychiatric service, and after-care services are being initiated.

9. Community mental health legislation patterned after the National Mental Health Act has been initiated in several States.

10. Coordination of activities on a regional basis has been established and encouraged through such agencies as WICHE and SREB.

11. The number of patients in mental hospitals has decreased slightly in recent years although admissions have continued to increase.

Future program planning indicates the following areas of need:

1. Strengthen planning and community organization to provide for stability of personnel and program at State and community levels.

2. Develop improved coordination and communication among agencies with an interest in mental health through the utilization of such techniques as joint advisory committees, inter-agency conferences, joint inservice education.

3. Development of consultation techniques including greater stress on family-centered and group-centered approaches.

4. Increase in studies in evaluation and epidemiology to locate and plan for "risk" population groups.

5. Encourage greater exchange of information and personnel between service agencies and universities to provide more appropriate teaching materials and improved training facilities.

6. Establishment of additional demonstration projects to test knowledge and technique in a variety of geographic areas and with different population groups.

7. Increased emphasis on the Career Development program to provide a continuing source of skilled personnel in the mental health disciplines to the Public Health Service.

8. Expand activities in critical areas such as aging, juvenile delinquency, and industrial mental health.

9. Encourage continued expansion of services in the areas of consultation to other agencies, public education, promotion of mental health concepts, training, and research.

PROGRAM ACCOMPLISHMENTS AND ACTIVITIES
OF THE COMMUNITY SERVICES BRANCH

Federal Legislation and Appropriations

No major Federal legislation directly concerned with the operations of the Community Services Branch was enacted during the year.

The appropriation for grants to States for community mental health was increased from \$4,000,000 in fiscal 1959 to \$5,000,000 in fiscal 1960 and the minimum grant was raised from \$25,000 to \$40,000. By administrative regulation the State matching requirement was changed from a Federal-State ratio of 2:1 to a 1:1 matching ratio. Almost all the States are expected to meet the new matching requirement without difficulty.

The appropriation for the Mental Health Project Grants program (Title V Public Law 911) was increased from \$2.8 million in fiscal 1959 to \$3.8 million in fiscal 1960. The total operating budget of the Community Services Branch for staff and administration in the fiscal year 1960 is \$1,473,000 as compared with \$1,319,000 for the previous year, an increase of \$154,000.

Branch Staffing and Administration

Of the 130 positions authorized for the Community Services Branch for fiscal 1960, 115 were filled and 15 were vacant. There were 69 professional staff members employed in the Central Office, regional offices, the Mental Health Study Center, and demonstration projects. As compared with the previous year, there was a net gain of two professional staff persons. With the acute shortage of mental health personnel, recruitment continues to be an important and time-consuming activity.

To help meet the problem of recruiting and training young psychiatrists and personnel in the other mental health disciplines in order to provide a continuing source of competent mental health staff for the Public Health Service, the Branch is intensifying its efforts to expand the Career Development Program.

The Branch is acutely aware of the desirability of staffing and extending its consultative services in areas of critical concern, such as aging, juvenile delinquency, mental retardation, and industrial mental health.

In April of 1959 the Central Office of the Community Services Branch moved to the Robin Building in Silver Spring, Maryland, where it is in close proximity to the Biometrics Branch of NIMH. The physical separation from the rest of the Institute, however, presents problems in communication that have been a source of concern. The Community Services Branch Advisory Committee at its annual meeting reiterated its

previous recommendation that as soon as possible the Branch should be housed with the rest of the Institute.

The regular annual meeting of the Community Services Branch was held in the Robin Building in June of 1959. The meeting was structured as a series of simultaneous work groups and considered problems relevant to the most effective use of grants-in-aid for State program development; the need for extending consultative service into additional critical areas, the trend toward decentralization of mental health programs as indicated through community mental health acts, the extension of services into rural areas, and the relationships of the regional offices with the States. Many useful ideas and a stimulating exchange of information came from this meeting.

Federal Grants-in-aid to States

In fiscal year 1959, \$4 million of Federal grants-in-aid to States were available to initiate, extend, and strengthen State and local community mental health services. In fiscal year 1960, Federal grants-in-aid were increased to \$5 million. These funds are used for the promotion of mental health and the prevention of mental illness and for other community-based services, exclusive of inpatient care in hospitals and institutions.

When the National Mental Health Act was passed in 1946, only 22 States had State community mental health programs or plans. Now every State has an organized program with one or more State professional staff to provide help and leadership to localities.

Federal, State and local funds budgeted by States for community mental health services reached a new peak of \$64.8 million in fiscal year 1959 - 20 percent (\$10.8 million) more than the year before.

About \$9 million of the increase in 1959 was budgeted for the expansion of clinical and local mental health services. It was planned to use the remainder to expand State-level staff, research, demonstrations, and training.

The Federal grant-in-aid (\$4 million) represented 6 percent of total funds budgeted by States in 1959 for community mental health services.

Since Federal grant-in-aid first became available, State and local funds have expanded enormously. State and local funds for community mental health skyrocketed from \$2.6 million in 1949 to \$61 million in 1959. Of course, progress in individual States and localities is the result of a complex of factors and forces. But there is little doubt that the Federal grant-in-aid program has had a significant impact in moving State and local programs ahead.

Federal grant-in-aid funds have been used as "seed money" to help establish a mental health service in a community such as, for example, an outpatient mental health clinic. After a few years of operation which have demonstrated the value of the clinic, local funds (sometimes together with State funds) have taken over full support of the clinic. Federal funds can then be freed from this community and used to initiate a new service in another community.

According to the State mental health program director in Connecticut: "In general for the past ten years an attempt has been made to use Federal funds for activities for which no State funds are available and to anticipate that such use of Federal funds will be temporary. In this way the Federal funds become a rather flexible source of support for experimental programs."

Federal funds are also used for so-called "growing edge" activities--for pilot projects, explorations of new methods of providing services, evaluative studies and for training. As the effectiveness of new services are demonstrated, State and local funds are used to take over the support. These projects are also contributing to the development of new knowledge.

The following is an excerpt from the 1959 Annual Report of the Community Mental Health Services of the New York State Department of Mental Hygiene: "Federal funds allocated to our State under the National Mental Health Act were used chiefly either for the support of training programs or for projects representing activities which are new in the community mental health field or are neglected by most community programs..... These projects included two day schools for seriously disturbed children, two learning disabilities centers, a job placement and counseling service for released mental hospital patients, a field trial of a school and clinical program for children with minimal brain damage, and an evaluation of an outpatient psychiatric service in a medical school."

Mental Health Project Grants (Title V)

The calendar year 1959 marks the completion of the second full year of operation of the Mental Health Project Grants Program. During this period there has continued a steady flow of applications covering a wide range of approaches to the search for a testing of new and improved methods, including administration, for the care, treatment, and rehabilitation of the mentally ill.

Several trends may be noted. There is an increasing quantity of proposed projects. This year, for the first time, the Mental Health Project Grants Review Committee recommended for approval a number of projects for which funds for full payment are not available. A second trend is that a number of applications which were first disapproved have been resubmitted in much improved form and have, therefore, received approval. Sometimes these resubmissions

have involved site visits or other consultation by staff of the Regional Offices and the Hospital Consultation Service. Thirdly, there has been a significant response, in the form of more and better applications, to the Institute's increased activity in certain special problem areas. These are: alcoholism; aging; services to children including the emotionally disturbed, the delinquent, and the retarded; and problems of administration and integration of services both institutional and in the community. Fourth, it is clear that both professional and non-professional people interested in this field are perceiving the Mental Health Project Grants program as a key factor in the stimulation, guidance, and support of "growing edge" developments. The staff is frequently requested to provide consultation or to participate in planning or evaluation conferences on larger problems beyond the scope of any particular project. An example is the 1959 Conference on Problems Associated with Research and Demonstrations in the Field of Psychiatric Rehabilitation held in New York City in June 1959, and supported through the Mental Health Project Grants program. Published proceedings summarizing the Conference on Rehabilitation will be available to interested persons.

We have received requests for information on current programs and research related to such developments as new modes of aftercare, changing professional functions and training, advances in various administrative practices, the organization of community facilities and specific treatment programs (e.g. alcoholics, mental defectives).

Before 1959 the Review Committee and staff had sensed that there might be prospective applicants who were in situations such that the most appropriate mechanism would take the form of a "developmental" grant, thought of as a relatively small-scale, short-term grant. These would tend to be of two main types--one would be to facilitate staff development; the other to facilitate the development of a more specific project. These developmental grants would usually be in the form of travel to the site of related ongoing programs, or in the form of bringing in expert consultation. Having received encouragement from the National Advisory Mental Health Council to proceed along such lines, the concept of the developmental grant was implemented by the dissemination of the idea through the Regional Office consultants and by the appointment of a sub-committee of the Review Committee to which was delegated authority to review and make recommendations on such applications. Five of these developmental type grants have been processed thus far, and, in the opinion of the Review Committee and staff, both the concept and the mechanism are working well and give promise of strengthening the Mental Health Project Grants program, especially in areas where the most vital need at a given time is to provide a catalytic agent for change, as distinguished from the support of full-fledged, sophisticated research or program development.

At the request of the Mental Health Project Grants Review Committee, this year the mental health consultants from each of the Regional Offices presented reports on problems and trends in mental health as seen in the context of the field experience of these consultants. Several main themes appeared in these presentations. They were:

1. Problems related to rapid population shifts and/or increases.
2. Need for more professional and auxiliary mental health personnel and for more training for them.
3. Need for coordination or integration of services.
4. Trends toward increasing children's services, residential treatment services, aftercare and rehabilitation services, volunteer services.
5. Administrative rigidities, especially regarding use of funds for out-of-State travel.

The Committee expressed great satisfaction with the reports. It was emphasized by both regional personnel and Committee members that benefits are visible not only in the direct effects of the projects being supported, but also indirectly as the program stimulates new thinking, and new contacts between agencies and institutions. The regional consultants characterized this as a "catalytic" function of Title V, a sort of "bonus" over and above the immediate gains of specific projects.

In the calendar year 1959 applications were received and processed as follows:

<u>Council Date</u>	<u>Applications Received</u>		<u>Applications Approved</u>	
	<u>No.</u>	<u>Amount</u>	<u>No.</u>	<u>Amount</u>
March 1959	71	\$2,898,538	22	\$ 520,770
June 1959	91	3,353,219	29	784,093
November 1959	81	3,120,541	33	939,871
Total	243	\$9,372,298	84	\$2,244,734

Hospital Consultation Services

A wide range of consultation activities have been engaged in by the staff of the Hospital Consultation Services Section during 1959 directed toward strengthening individual programs and integrating hospital and community programs to provide a continuity of service for

patients to better meet the needs of the individual.

Consultative efforts have been directed toward providing information about new ideas and activities, helping with plans for the application of new practices to new situations, coordinating program activities of related agencies and individuals, and providing information regarding available resources. Through the stimulation of new applications for Mental Health Project Grants, effective consultation involving central office and regional office staff can be employed in a variety of program developments. Hospital Consultation personnel have participated in numerous seminars related to staff development in State programs and institutions as a method of facilitating change in these areas. Particular emphasis has been directed toward the development of staffing patterns and personnel practices that will provide stability and standards of practice consistent with current knowledge.

Efforts have been made to help bridge the gap between professional education and needs of the field by coordinating the planning of Universities with State institutions and programs. By gearing training programs to meet the needs of developments in State planning it is possible to merge the interest of universities and field operations to the mutual benefit of each. This has served to open institutional programs and more closely relate them to the community and the training centers.

Planned visits have been made to each regional office in order to obtain an overview of developments in each State concerning programs for the mentally ill with special consideration for the most effective use of Title V projects.

Through the use of consultation for ongoing projects it has often been possible to reach other areas of programs in institutions at the point where the project is beginning to have an impact on broader program planning. Continued contact and consultation from regional office personnel in all aspects of planning is then a logical development. There has been a constant flow of visitors to the offices of Hospital Consultation Services by personnel from public and private agencies in the United States as well as personnel from foreign countries to discuss new trends and concepts in the care, treatment, and rehabilitation of the mentally ill. In this regard it has been an asset to be housed again with the rest of the Community Services Branch so that planning and consultation can be integrated and expedited on the basis of total Branch planning. It has been more difficult, however, to maintain communication with other parts of the NIMH and has created some difficulties for visitors who desire to see several persons in related programs.

As a result of the Colorado survey made by Hospital Consultation and regional staff in 1958, the State is making efforts to develop a comprehensive mental health program. A State-wide advisory

committee has been appointed and a Department of Institutions has been created with authority and responsibility to approve and coordinate the quality of care in all State institutions. An Inter-departmental Board has been established to develop a balanced program of prevention and treatment services.

During the year, work has been started on surveys of the mental health program of North Dakota and of the program at the Medical Center for Federal Prisoners at Springfield, Missouri. Both of these will be completed in the first half of 1960.

Staff of the Hospital Consultation Services Section has represented the NIMH on an Ad Hoc Committee on Planning Mental Health Facilities appointed by the Surgeon General to develop treatment and administrative guide lines to be used for more realistic planning and programming for the construction of mental health facilities.

Alcoholism

Central and Regional Office consultation to State and local agencies increased during the year as alcoholism program activities became a part of the more comprehensive public health and mental health planning. Consideration was given to alcoholism services in local health departments, to more effective treatment in general hospitals and in outpatient services, to the role of the public health nurse, to alcoholism and tuberculosis, to the problem of alcoholism in industry and to others.

Eleven (11) technical assistance projects relative to alcoholism were supported. (See section on Technical Assistance Projects)

The mental health consultants in Region III (Charlottesville) and Region VII (Dallas) arranged one day meeting with State-level alcoholism program personnel in their areas. A similar two day meeting was held in Region IV (Atlanta).

A special research grant concerned with behavior, including alcoholism, of a tri-ethnic population started in early 1959. This is being conducted by the University of Colorado and will seek to gain information helpful in developing more effective approaches to Indian mental health. In regions having sizeable Indian populations, there has been increased attention to their alcoholism problem and the inclusion of Indians in meetings, in planning, etc.

The Mental Health Study Center, NIMH, developed a collaborative pilot project with the Prince Georges County (Maryland) Health Department to demonstrate over a four year period a public health approach to problems of alcoholism in the family.

The Branch's interest and activities in alcoholism were among the topics presented at a two days June meeting of the Regional Medical Directors. A panel of consultants to the Branch's activities

in alcoholism was appointed and will have its initial meeting in December.

Four mental health consultants from Central and Regional Offices attended the 1959 Yale Summer School of Alcohol Studies. The School was assisted in obtaining the services of three resource personnel so it could give more emphasis to other public health aspects, to the epidemiology of alcoholism, and to tuberculosis and alcoholism.

The one-week Schools of Alcohol Studies in Michigan-Wisconsin, North Dakota, Texas and Utah were aided in giving more attention to medical aspects of alcoholism and to education about alcohol and alcoholism by providing each with the services of one or two resource personnel for a limited time. In addition, State conferences in North Dakota, South Carolina and Virginia were aided by the services of one to three resource personnel for selected topics.

Liaison was maintained with interested organizations, such as The National Council on Alcoholism, and the North American Association of Alcoholism Programs.

The report of a Research Conference on Problems of Alcohol and Alcoholism, which was held in 1958, has been published and has been given wide distribution to State public health and mental health agencies, separate alcoholism commissions and boards, libraries of medical schools, schools of public health, universities preparing mental health and other professional personnel, and selected foreign personnel.

The Public Health Service has awarded a one million dollar research grant to support a five year coordinated study of alcoholism in the United States and Canada and to recommend future action. The grant, to the North American Association of Alcoholism Programs, provides for establishing an independent Co-operative Commission on Alcoholism. Attention will be given to public health aspects and approaches relative to alcoholism.

School Mental Health

An increased interest in the area of mental health in education on the part of State Mental Health Authorities is reflected in the larger number of requests to regional mental health personnel and to the national consultant on mental health in education for technical assistance. For example, the mental health and education agencies of North Carolina requested help in exploring programs to promote "emotional readiness for school." The State Mental Health Authorities of Michigan and Massachusetts reviewed their school mental health related activities with assistance of our staff.

Requests for consultation on the development of school programs for emotionally disturbed children continue to be a major area of service. The major need in this field appears to be the development

of satisfactory patterns of education and mental health staff liaison, both at the State and the community level in order to bring their combined competencies to bear on strengthening services to school children with emotional problems. The same need for interagency and interdisciplinary cooperation has been evident in Conferences held this year with the U. S. Office of Education, the National Education Association, the American Personnel and Guidance Association, the National Association of Social Work, and the National League for Nursing on ways to improve collaboration between pupil-personnel and school health staff members in school systems.

The widening interest of other national organizations in school mental health activities is reflected in requests to the national consultant to discuss various aspects of this field before the national conventions of the National Education Association. In addition, the President of the National Congress of Parents and Teachers asked and received the services of the central office consultant to discuss various aspects of this field before the national conventions of the National Education Association, the National Congress of Parents and Teachers, and sessions of the American Orthopsychiatric Association. In addition, at the request of the President of the National Congress of Parents and Teachers the central office consultant drafted a 3-year program for use by 44,000 local units in promoting parent study groups, school mental health, and community mental health programs. The National Training Laboratory of the National Education Association and the School of Education of the University of Maryland were given a month's full-time consultation service in helping them develop new training programs for the psycho-sociological education of school administrators.

Liaison with the U. S. Office of Education focused on the mental health aspects of school health, pre-school education, and administrative training. Branch staff were utilized by the Commissioner of Education to consult on the role and function of the new school social work consultant to be added to his staff. Consultation to departments of the National Education Association were provided on the mental health aspects of testing and guidance, juvenile delinquency, TV education, curriculum development, and teacher-morale studies.

The Community Services Branch of the NIMH has collaborated with the Association for Supervision and Curriculum Development in holding two national conferences to increase the communication of behavioral-science understandings to curriculum development personnel. At each conference four leading behavioral scientists used a day each to review for 80 curriculum research directors the current research findings on "Underdeveloped Capacity to Learn" and "Individual Differences."

In summary, the increased flow of research applications, papers in the literature, conferences, personnel added, new programs, and consultation requests document an increased attention to this area of mental health practice.

The Mental Health Study Center

Since many of the most important mental health problems arise in communities, are lived out in communities, and are resolved in communities, the Community Services Branch operates the Mental Health Study Center in Prince Georges County, Maryland, as a field station to provide a setting for the study of problems of community mental health. The Study Center functions in four major areas, operation: (1) a research program; (2) a mental health consultation service, (3) a limited all-purpose psychiatric outpatient service; and (4) a training program for various professional personnel. The staff of the Study Center are called upon from time to time to act as consultants outside of the County.

The research program of the Study Center is conducting projects concerned with "The Epidemiology of Reading Ability and Disability," "The Relationship Between the Center and the Medical Community," a "Review of School Referrals," a "Patient Record System," an "Evaluation of Clinical Procedures," and a "Community Characteristics Classification System."

Research in The Epidemiology of Reading Ability and Disability has been carried on since 1954. The study was undertaken because of an apparent increase in reading disability among youngsters, the high degree of community concern among parents and others associated with problems of youth, and the possible relationship between reading disability and other mental health problems. The study is concerned with approximately 65,000 public school children of Prince Georges County. It is directed toward learning: (a) the location of reading difficulties and the level of reading ability in several sections of the County; (b) some of the clinical characteristics of the population and the dynamics of the child with reading difficulty; and (c) some characteristics of the social setting in which the problem occurs.

The demographic phase of the study was completed during the first half of 1959, based on data collected for a three year period. It appears that the quality of reading ability is associated with larger geographical areas than school districts and usually more meaningful ones in terms of sociological and economic variables. Early results indicate that the problem is multi-dimensional and differences reflect more than the simple socio-economic status of the inhabitants. Interesting differences between the performance of male and female students have emerged which require further study.

County-wide records are being maintained on the results of the annual testing program in the schools. This permits continued assessment of stability or change in reading levels both for individual schools and the County as a whole. The records permit comparison of a given grade in a particular school with other grades in the same school, with the same grade in other schools, and with the same grade in different years. It is also possible to trace a single grade through as much of its history as is available. Through standardized

mapping and charting procedures a continuing graphic representation of the reading status of all County public schools has been made possible.

A Cohort Study of the entire sixth grade school population of 1954-55 (approximately 5,000 children) is being continued to test the hypothesis that reading difficulty identified early can act as an indicator of psychopathology. The clinical study of groups of boys with reading difficulties and their parents in collaborative group therapy is also continuing. These studies are contributing much to staff understanding of the inter-personal, family, and cultural dynamics that appear to be so significant in this syndrome.

The Study of the Relationship Between the Center and the Medical Community indicates that most mild and advanced mental illness is actually managed by the general practitioner or non-psychiatric specialist. An effective use of the Study Center might be the collaboration with groups of physicians in their management of cases in which emotional factors are a significant feature in order to make the role of the physician more rewarding to him and his patient.

Through the Patient Record System study and the Evaluation of Clinical Procedures, the Study Center has evaluated and modified its clinical forms and tested the applicability of microfilm as a device for storing data related to a psychiatric outpatient clinic. Initial procedures have been revised to increase the therapeutic value of the Center as a community clinic and increase the use of allied professional groups working with mental health problems of the community. At present the Center is seeking ways to speed up patient processing to see if help can be arranged for in a more expeditious fashion. By utilizing an advance written questionnaire and physical examination before appointments, it is anticipated that more effective use can be made of the intake process.

The Study Center has continued a wide range of community activities through active participation with a variety of allied professional facilities, citizens organizations, and planning groups. It has also continued its direct patient service which involves about half of the time of the staff. A few patients are seen in traditional long-term treatment. The emphasis, however, has been on a variety of more economical treatment methods including: (1) diagnostic evaluation and return to the referring agency, (2) therapeutic intervention directed toward intra-family pathology by such methods as collaborative therapy and group therapy, (3) collateral therapy with a cooperative agency, such as a school or local physician, (4) group treatment, (5) unscheduled intermittent therapeutic sessions during periods of crisis. This has resulted in a wide spectrum of services from which the most appropriate can be chosen for the individual case. Consultation with other community agencies is an important part of the Study Center's role. A trend has been noted toward consultation concerning problem clients who never become patients at the Center but are successfully managed by the consulting agency.

The contemplated training program for students in the mental health disciplines has been delayed because of personnel changes. The objective of the Center's training, whether for new staff or students, is the development of the community, public health, or social point of view so that the individual may be better prepared to function effectively in the community services area. The program provides for a blending of clinical, consultation, research, and community organization experience into a public health framework.

During 1959, the Study Center had over 170 individual requests for information related to its activities. One hundred and sixty-two individuals from the United States and abroad visited the Center.

Demonstrations

Three demonstration projects are currently being conducted through the Community Services Branch.

The School Mental Health Demonstration to explore methods of developing minimal school mental health services in a rural county completed its first year in its new location at Sanford in Seminole County, Florida. Local health and education personnel, assisted by the NIMH staff assigned to the project, set up a trial program in three schools. Children with emotional, behavior, and learning problems were nominated by their teachers and seen individually by the project staff. Health and education personnel then held case conferences on each child at which plans for classroom management and community assistance for these children were formulated. The success of the project in demonstrating a feasible approach is evidenced by the willingness of the Florida State Mental Health Authority to take over and man the project for next year. The NIMH will continue its support of the project and its studies related to the project.

The Drug Addiction Demonstration Center in New York City was established in 1957 as an experimental project to refer selected discharges from the Public Health Service Hospital in Lexington, Kentucky, returning to New York City to appropriate community agencies for rehabilitative help, to assist community agencies to offer services to drug addicts, and to continue a longitudinal study of patterns of relapse and certain aspects of the community adjustment of a sample of discharges from Lexington.

Agreements have been developed with the major public and voluntary community agencies to accept patients who, in the opinion of the Center staff, are able to make effective use of their services. Difficulty was experienced in locating suitable patients for referral - those who were totally abstinent and highly motivated - in keeping with initial agreements. Agencies have been helped to view relapse more dynamically and to agree to accept patients who use drugs irregularly.

To date in the Demonstration Center project a substantial

number of referrals have been made to several employment services and the New York City Department of Welfare. Through the efforts of the Demonstration Center the policies of these agencies have been modified and services extended to addicts referred by the Center.

Through use of a case work relationship the staffs of the Center and of other agencies have been able to help a number of addicts abstain from the use of drugs for increasing periods of time. The relapse of many patients to drug use, however, poses the question of what constitutes appropriate goals for work with addicts. If drug addiction is considered a chronic illness, conventional ideas of "success" and expectations of "cure" need to be revised.

In cooperation with the social service staff at Lexington, the Center has begun to work with patients' families in order to prepare for patients' return. The Center staff has come to consider addicts less as unattached persons and more as members of family groups. Currently, community agencies have recently begun to develop coordinated programs for multi-problem families in which there exists a high incidence of social maladjustment, including juvenile delinquency and drug addiction. They have realized a need for preventive work before the problem has become crystallized in addiction or delinquency and have begun to develop programs for these families.

In the past year the Center has functioned increasingly as an informational and consultative resource, answering inquiries by interested lay and professional persons. Its influence has been extended through consultation with community agencies, participation in public conferences and seminars, membership in municipal and voluntary committees interested in formulating programs for the management of addiction, and testimony at City and State hearings investigating the problems of addiction.

The demonstration project concerning a Public Health Approach to the Problem of Alcoholism was begun in July 1959 as a joint four-year project of the Mental Health Study Center and the Prince Georges County Health Department. This project is aimed at interpreting known techniques of prevention, education, treatment and rehabilitation in the field of alcoholism into the total complex of public health planning and services in a large suburban county. The program will include: (1) in-patient services to alcoholic patients in the Prince Georges General Hospital for purpose of diagnostic evaluation, case work service to the patient and his family, group psychotherapy, and introduction to Alcoholics Anonymous; (2) out-patient services to discharged alcoholic patients from Prince Georges County Hospital, as well as other individuals referred directly; (3) an educational program aimed at informing professional and public groups about problems of alcoholics; and (4) an evaluation of these programs through the systematic selection of data to measure its effectiveness.

The demonstration will explore such areas as the total number

of persons reached with problems of alcoholism, methods of reaching these people, types of service offered to individuals and families, the involvement of other agencies, associated problems existing in the families, the duration of these problems, and the cooperation of the alcoholic group in terms of geographic location, socio-economic status, and sub-culture.

Technical Assistance Projects

In 1955 the Community Services Branch developed the idea of extending the consultation and technical assistance now provided to States through technical assistance projects. These projects are developed by the staff of the Community Services Branch in cooperation with State mental health agencies and are designed to be educational in nature and directed toward new program developments. This method of providing consultation and technical assistance to the States has been received with enthusiasm. There has been a sound and steady growth in the use of technical assistance projects.

The impact of technical assistance projects are not limited to the State in which the project is held since reports of the projects are published and distributed throughout the States.

In 1959 there were 27 technical assistance projects completed at a total cost of approximately \$108,200. (In 1958 there were 17 completed at a total cost of approximately \$66,000). In 1959 the average cost of a technical assistance project was approximately \$4,000. The following is a list of the projects completed in calendar year 1959:

<u>State</u>	<u>Title</u>
Colorado	Processing the Alcoholic Defendant
Connecticut	Interpreting a Mental Health Program Through Media of Mass Communication
Connecticut	Realizing the Potential in State Alcoholism Programs
District of Columbia	The Alcoholic Tuberculous Patient and the Community
Florida	The Role of Pastoral Care in the Rehabilitation of the Alcoholic
Florida	Some Immediate Concerns of Social Service Programs in State Mental Hospitals and State Hospitals for the Mentally Retarded
Florida	Pastoral Counseling
Georgia	Mental Health in Schools

<u>State</u>	<u>Title</u>
Indiana	Mental Health Research
Kansas	Responsibilities and Functions of Community Mental Health Centers
Kansas and Missouri	Education about Alcohol
Kentucky	Institute on Psychiatric Rehabilitation Centers
Massachusetts	The Family Centered Approach to Alcoholism
Massachusetts	New Developments in Community Mental Health
Minnesota	Alcohol Education
Mississippi	Community Resources for Rehabilitating the Alcoholic
Missouri	The Public Health Nurse - A Mental Health Resource
Nebraska	Vocational Rehabilitation for the Mentally Ill and the Mentally Retarded
New Jersey	Practical Problems of Coordinating and Integrating All Services Related to the Treatment, Training and Management of the Mentally Retarded
New Jersey	Alcoholism as a Mental Health Problem to Labor and Management
New Jersey	Alcohol Education in the Schools
New Mexico	Recreation, Child Welfare, Mental Health - Developing Local Resources for Community Mental Health
North Dakota	A Preliminary Survey of Resources Available in North Dakota for the Mentally Ill and Their Families
Oregon	Pastoral Problems and Clinical Understandings
Pennsylvania	Conference on Case Consultation for Mental Health
South Dakota	Training for Membership on Boards of Com- munity Mental Health Centers in South Dakota (First part of this project held in 1958)

<u>State</u>	<u>Title</u>
Vermont	What a Teacher Should Know to Teach Alcohol Education

Inter-state Institute for Program Development for State Staff

The second mental health Institute for Community Mental Health Program Personnel was held April 20-24, 1959, in Newport, Rhode Island. Included were selected States from Regions I, II, III, IV, V and VI. The States included for this course were those within the above regions with small or medium-sized programs, in order to permit consideration of program planning and administration practices. The first mental health Institute was held at Brighton, Utah, in April 1958, and included the States in Regions VII, VIII and IX, with the exception of California. A third Institute for the larger States such as New York, Pennsylvania, Illinois and California is being planned for the Spring of 1960. This series of courses is being sponsored in accordance with earlier recommendations made by the State and Territorial Mental Health Authorities.

The Newport Institute was patterned after the Brighton course, the theme of the week being "Prospective planning for State mental health programs - What are the elements needed in a State to plan and develop a State-wide program?" Consideration was given to such aspects as administration, public interest and power structure, personnel, budget and fiscal problems, and mental health program areas. Outstanding authorities in community organization and State mental health programs, several of whom participated in the first workshop, were selected as faculty members to give formal presentations and to serve as discussion group leaders.

Consultation on Research and Evaluation

Increasing requests from the Regional Offices are being made for consultation services from the Section on Program Research and Evaluation. As time goes on more and more State and local agencies are concerned with evaluation of their programs. These activities have ranged from mental health program research and evaluation in general to consultation on projects in which more specific psychological, cultural and methodological aspects have been involved.

Also, through this Section the various technical research resources in the many laboratories and branches of the Institute, as well as consultants from outside the Institute, are made available to the Regional Offices and State mental health programs.

At the request of the Chief, Resources Analysis Section, Office of Research Planning, NIH, a staff member from the Program Research and Evaluation Section and one from the Mental Health Section Region IX,

served with other members of an evaluation team which visited California to assess the adequacy of the mental health information prepared for the National Institutes of Health in last year's pilot survey of medical and health related research.

Five States were included in the pilot survey, namely, California, Michigan, Florida, New York and Connecticut. NIH is presently considering extending this survey to include some twenty States which would account for over 90 percent of medical and health related research expenditures and manpower resources. Before launching on the more extensive survey, it was deemed advisable to evaluate the adequacy of the earlier survey by selection of one of the five States for more intensive survey. Inasmuch as approximately fifty percent of the reported expenditures in medical and health related research was in the area of mental health, it was felt advisable to have mental health representation on the team, both from the Regional Office and from Central Office.

Program Analysis

The major activities in program analysis during the past year have been concerned with mental health education, juvenile delinquency, staff work with sub-committees of the Community Services Advisory Committee, and the preparation of a report on the Interstate Institute for Program Development for State Staff held at Newport, Rhode Island.

From the Newport Conference the papers presented and pertinent material from the discussions are being compiled and edited in order that a publication may result which will be of value in further training of State-level staff.

All regional offices were requested to submit reports relative to activities of State mental health agencies in the area of juvenile delinquency, as well as a review of ongoing programs and prospects in the States that seemed significant in the prevention and control of delinquency. Recommendations were also requested. This information was reviewed and summarized as an expression from the Community Services Branch of its interest and concern in future planning in this area.

The program analysis staff is working with two sub-committees of the Community Services Advisory Committee on the problem of "Training of Professional Personnel for Consultation in Community Mental Health" and "Mental Health Services in Rural Areas." These committees will make recommendations to the Community Services Advisory Committee for its further consideration of methods of meeting needs in these two areas.

By way of implementing the Branch's interest in a survey of the mental health education practices of the State Mental Health Authorities, a special consultant was engaged to make visits to one State in each of the nine USPHS regions. The States, as nominated by the regional mental health consultants, were Region I, Massachusetts; II, Pennsylvania; III, Kentucky; IV, Georgia; V, Michigan, VI, Minnesota;

VII, Texas; VIII, Idaho; IX, Oregon.

Of the nine States visited, six had personnel designated as mental health education workers. However, not one person specially trained as a mental health educator or health educator was found in a mental health education position. Psychiatric social workers carry the principle responsibility.

The activities included under mental health education ranged widely from (1) public relations and publicity through (2) public information programs on the nature of mental illness and mental health, (3) special training programs for professional groups covering techniques useful for helping and understanding the mentally ill, (4) community organization programs for developing local facilities for treating the mentally ill, and (5) programs for integrating and relating community agencies, both public and private, in the interests of State-wide mental health education.

In most States, agencies other than the State Mental Health Authority were involved in activities which might be subsumed under mental health education. Church, farm, labor, civic, industrial, medical, and other groups provide training in child rearing practices, in effective interpersonal relations, and other related subjects. The State Mental Health Authority was not always the spearhead for the State mental health education activities, but is emerging in some States as the central coordinating agency.

Among the problems identified were the needs to clarify what should be taught to the public, and how to teach it, although there was greater consensus on the latter. The content emphasis of education programs ranged from a mental health concern with maximizing the normal person's social and personal effectiveness to a mental illness concern with informing the general public and specific individuals and groups as to how to relate to the mentally ill. Research findings in the area of communication were being made available slowly to provide a more factual base for planning programs designed to change attitudes and behavior. Problems of an ethical nature regarding behavior change provided another area that needed exploration. The need for intensive study and clarification of the issues in several areas seems very great.

A report of the study is in preparation.

Conferences of Chief State Psychologists,
Social Workers, and Nurses

The Community Services Branch helps to staff and plan annual conferences for top level State community mental health staff in the mental health disciplines of psychology, social work, and nursing. These conferences provide an opportunity for State-level personnel in one discipline to exchange ideas, information, and experiences on program developments in the various States.

The Ninth Annual Conference of Chief Psychologists in State Mental Health Programs with staff of the National Institute of Mental Health met in Cincinnati, Ohio, September 1-2, 1959, two days prior to the Sixty-Eighth Annual Convention of the American Psychological Association, and was attended by 57 psychologists from 37 States, the District of Columbia, and Puerto Rico. Principal subjects discussed were: applications of therapeutic principles in State and local mental health programming; growing opportunities and responsibilities for research in community mental health programs; and, collaborative efforts to provide more and better trained psychologists, including the development of skills in consultation and in administration. Work groups of chief State psychologists reports on the results of a survey of evaluation and research activities of conference participants; a study of consultation as a professional tool; and, a symposium on administration. A new work group was formed to explore further the research opportunities in mental health programs.

The Eleventh Annual Conference of Chief Social Workers from State Mental Health Programs was held in San Francisco, California, May 21-23, 1959. There were 56 individuals in attendance representing 28 States and the Public Health Service. These conferences were initiated by the NMH in 1949. Each year since that time the State personnel have assumed an increasingly greater responsibility for the conferences with the CSB staff serving in an advisory capacity and also providing some of the staff work to plan, organize, and carry out the meetings. A determination is made on a year by year basis as to the advisability and need for another meeting. These are working conferences designed to give participants an opportunity to discuss common problems and to learn new techniques and methods used in programs throughout the country. The theme and principal topic considered by the entire conference was "The Role of the Psychiatric Social Worker in Community Organization. Consideration was given to national mental health program developments such as the trend toward the expansion of community mental health programs through State mental health acts.

The Annual Conference of Mental Health and Psychiatric Nurses from State Mental Health Programs was held in Atlantic City, New Jersey, on October 17-18, 1959, preceding the meeting of the American Public Health Association. There were approximately 80 participants. The principal topic under discussion was services to the mentally ill patient and his family and the increasing responsibility which nurses are taking in this area of service. A report of "Mental Health and Psychiatric Nursing Activities in State and Local Mental Health Programs for 1959," prepared by State and regional consultants, and a Source Book of current literature, were made available to the State consultants prior to the meeting, as background information for discussion. This is the second year in which material of this kind has been developed. The summaries point up the increased involvement of nurses in all of the areas of mental health and the increased need for personnel. The relation between available personnel and available positions continues to widen rather than lessen.

Approximately 50 psychiatric and mental health nurses met in

Buffalo, New York in conjunction with the Annual Mental Hospital Institute sponsored by the American Psychiatric Association on October 19, 1959. The general session was concerned with research projects involving nurses and some of the major gaps in this area. The remainder of the Conference involved small group discussions on such topics as staff needs and utilization, nursing education, inservice education, and new trends in patient care.

Liaison with National Agencies

Liaison has been maintained with the Office of Vocational Rehabilitation, the Children's Bureau, the Bureau of Public Assistance and the National Association for Mental Health. Conferences were held by Community Services Branch staff members and representatives of the Bureau of Public Assistance around extending public assistance benefits to the mentally ill in hospitals. One staff member has worked closely with the National Association for Mental Health in exploring and developing program areas of mutual concern. The Assistant Executive Director of the National Association for Mental Health attended the meeting of the Community Services Committee as an observer. Two staff members served as resource specialists in an NAMH sponsored institute for directors of State and local mental health associations.

At the request of the National Association of County Officials one staff member assisted in planning a meeting of the Mental Health Committee of this organization. This meeting was held in Detroit in connection with the Urban County Congress of the National Association of County Officials. The Branch also supplied a consultant to meet with their Mental Health Committee.

1960 White House Conference on Children and Youth

The Community Services Branch has assigned one staff member to devote full time to assist in planning, organizing, and carrying out the conference. This staff member will also assist in preparing the reports of the conference. In addition another staff member is functioning as the main liaison between the NIMH and the White House Conference Staff.

1961 White House Conference on Aging

Community Services Branch staff in both central and regional offices are assisting in the organization, planning and development of the above conference in a variety of ways. Three staff members in the central office are serving as technical consultants to the conference committees on Community Organization, Social Services, and the Committee on Family Life, Family Relationships and Friends. Regional office consultants are working with regional representatives for the Conference and, through State mental health agencies, with State committees responsible for State conferences on aging, being

held preliminary to the First White House Conference on Aging to be held in 1961.

World Mental Health Year

The Community Services Branch has appointed a committee to consider appropriate activities for NIMH to sponsor as a contribution to World Mental Health Year, which will be initiated beginning in 1960 by the World Federation for Mental Health. One activity presently under consideration is the establishment of a clearing house for mental health research and program data. It was felt that this proposal would be most appropriate to the goals of WMHY. If such a clearing house were established, much of the material could be made available to the World Federation for Mental Health headquarters in London.

Initially such clearing house activities could be developed to meet a need within the Institute, using data presently available from the various branches and laboratories. At a later date consideration could be given to expanding the clearing house activities to include data from private and public agencies throughout the country engaged in mental health work.

A staff member from the Branch served as deputy for the Director of the National Institute of Mental Health at the deliberations of the World Mental Health Year Committee, as observer at the meetings of the Board of the World Federation for Mental Health, and in attendance at the Twelfth Annual Meeting of the Federation. These sessions and meetings were held in Barcelona, Spain, during the period August 24 to September 4, 1959.

Conference of State and Territorial Mental Health Authorities

The annual Conference of State and Territorial Mental Health Authorities with the Surgeon General was held on March 11-13, 1959. Several significant recommendations were made. Among these were:

Establishment of an Ad Hoc Committee of State Mental Health and Hill-Burton Authorities to work with the Public Health Service in formulating guide lines for treatment and administration which could be utilized by the State agencies in developing a State-wide plan for mental health facilities. This opens up the possibilities of utilizing hospital facility funds for a variety of structures adaptable to current concepts of care for patients with mental health problems.

The use of Hill-Burton funds for inter-State hospitals, homes for exceptional children, or residential treatment centers was recommended.

The matching basis of the Federal grant-in-aid should be changed from 2-to-1 to 1-to-1, (this became effective July, 1959); and cost of case statistics, based on case treatment costs, should

be developed. If additional grant-in-aid funds are available the minimum grant should be increased from \$25,000 to \$40,000. (This became effective July 1, 1959.)

Community Services Advisory Committee

The Community Services Advisory Committee held its annual meeting on April 9 and 10, 1959.

The Committee directed its attention to the great variety of needs and requests that come to Regional Offices that necessitate specialized skill and understanding in many areas. The use of other consultants as resource people in special areas was seen as a need. It was pointed out that one of the functions of Community Services Branch personnel is to have knowledge of resource people that might be available to the States as consultants in special areas.

The relationship between Regional Office personnel and State Mental Health Authorities was discussed and related to problems of communication and function. Regional Offices have a responsibility to work with other public State agencies and private agencies as well as with Mental Health Authorities and frequently they can help to improve communication among various State agencies. It was also noted that many agencies, both public and private, function in the area of mental health so that traditional patterns of public health channels are not always adequate. Problems of communication and coordination vary considerably within different States. It was suggested that interdepartmental committees within States are often helpful in alleviating some of these problems.

The Committee discussed developments relative to the use of State and Federal funds to promote and develop community mental health programs in order to provide a well rounded and balanced operation. It was pointed out that there is no clear definition of what should be included in a local mental health program, that problems of administration and staffing are extremely difficult and tend to follow a variety of patterns, and that the distribution of funds available has many complexities when related to local tax problems. Because of the volume of funds going into these community programs, evaluation is necessary in order to convince the appropriating body that results are being produced.

The Committee also considered the degree of judgment concerning areas of service that should be left to local decision. It was recognized that local interest might be concentrated in clinical service and that the "growing edge" type of program activity might be neglected. This could be modified through State influence at the local level, with discretion relative to program content.

Problems of staffing were discussed and related to traditional training in the various disciplines and the need for training in community skills in the mental health areas.

The Committee considered the development of trends in the care and treatment of the mentally ill that tend to keep patients in the community or return patients to the community after brief hospitalization. It was recognized that these new treatment procedures for the mentally ill and the mentally retarded have extensive implication for other members of the family as well as for the community. There is a need to know much more about the effects on the individual as well as on siblings, family groups, and school and community contacts in order to evaluate the ramifications of these programs and to indicate whether or not they should be modified and what new programs might be developed.

The Committee discussed methods of measuring stress in families and communities and the network of human relations in families and neighborhoods. Stress reactions of various ethnic groups were explored and related to such areas as relocation, political organization, social agency relationships, dependency, parental control and supervision, delinquency, and alcoholism. It was pointed out that base line data concerning the flow of population in and out of neighborhoods can provide valuable indices to understanding of social problems. Thus, in order to understand the impact of an unrecovered schizophrenic child in the family it is essential to have a much more comprehensive frame of reference related to demographic studies and sociological and anthropological interpretations and evaluations.

It was recognized that parent groups often are very active in precipitating program development in areas where need is apparent to them but that implementation and evaluation of these programs becomes quite complex. This also leads frequently to related activities within a variety of agencies with resulting problems of communication on the Federal, Regional, and State level.

As a result of discussion it was decided that the Community Services Committee should form two sub-committees to consider:

1. The qualifications, selection and training of a person for a position as a community mental health consultant and a description of the functions of the position.
2. How can mental health programs in rural areas be developed and promoted.

It was pointed out that there is at present great discrepancy among the types of services individuals perform in the area of community mental health and great variances in the people selected to do the job and the training of these individuals. Because of the shortages of professional manpower there is a need to consider the problem of the minimal professional qualifications necessary to get the job done effectively. It was pointed out that the two subjects have overlapping and interlocking aspects. It was also suggested that it would probably be desirable to accumulate information about

the current situation throughout the country as related to community mental health workers.

The sub-committees could draw upon other personnel for assistance as well as staff of the Community Services Branch, and many aspects of these questions would also be related to other branches of NIMH. It was suggested that the sub-committees arrange to meet for two or three days at any location indicated by them.

Regional Office Activities

Mental Health Consultants in Regional Offices represent a major link in between the NIMH and the State and local mental health programs. It is as a result of continuing visits and consultation with mental health agencies that information regarding new trends, developments, and programs is transmitted between NIMH and operating services.

Regional Office Mental Health Consultants provide information and assistance to mental health programs in helping them to utilize most effectively the resources of the Community Services Branch as provided through Professional and Technical Assistance, Mental Health Project Grants, and Grants-in-Aid to States.

Through reports submitted by regional office personnel concerning activities, programs, and changes taking place in the States and communities, it is possible to obtain a comprehensive review of developments in the area of mental health throughout the United States. These observations and reports are summarized in the following material.

DEVELOPMENTS IN STATE AND LOCAL PROGRAMS

Introduction

The findings of three opinion surveys about mental health programs were released during the year. They provide significant data about attitudes towards mental health services.

A national Roper poll found that, next to education, the American people are most willing to be taxed for the care and treatment of the mentally ill. A second sample survey, conducted for the Joint Commission on Mental Illness and Health, reported that people who want help with mental problems tend to go to their clergymen four times as often as to psychiatric personnel and to their family doctors two-and-a-half times as often.

A third survey of a nationwide panel of public health directors found that they named "more mental health services as America's top priority community need."

State Organization

At State level, major organizational changes during the year were made in three states, Georgia, Hawaii, and Alaska. In Georgia, the State mental hospital program was transferred to the State Department of Public Health. In Hawaii both the State Mental Hospital and the Home for the Mentally Retarded were transferred to the Health Department. In Alaska, the separate departments of Health, Welfare, and Juvenile Institutions were consolidated into a single Department of Health and Welfare (the Mental Health Authority).

Also significant was the legislative action taken in several States which placed responsibility for the State alcoholism program within the health department or mental health department. In addition, administrative changes in several States resulted in setting up organizational units on mental retardation which reflected the increasing importance being placed on these services.

State-Local Community Services

Two more States, Maine and Wisconsin, passed community mental health laws in 1959 patterned after those in New York and California which provide for continuing State grants-in-aid to localities on a matching basis. In Maine a very small appropriation was provided for this purpose, but in Wisconsin \$475,000 was appropriated for the biennium.

Most of the States which have had such laws in operation (California, Connecticut, Minnesota, New Jersey, New York, Vermont) report a rapid and extensive growth of local mental health services, particularly clinics. State and local funds available for mental health services have multiplied. Applications from localities often exceed available State funds. State operated clinics are being supplanted by locally administered clinics with State grant support.

New York now has locally organized mental health services in 31 counties covering 90 percent of the State's population. Of the remaining counties without local programs, most are rural and have few professional personnel available. In New York, as State grant-in-aid funds became available, Federal funds were withdrawn from local services and used to develop new areas of activity or directed toward training and research. Also, plans have been made to discontinue State operated child guidance services in communities which receive State grants-in-aid for their locally administered programs.

A basic feature of these community mental health laws is the premise that the responsibility for community mental health programs is shared jointly by State and locality. Neither the State nor the locality is expected to bear the full cost of the programs. In Illinois (which does not have a formal community mental health act) the Mental Health Authority came to the conclusion that it is not realistic to expect clinics to be wholly supported by local funds. As a result, the State's policy was changed so that grants to localities are made on a continuous basis.

The trend towards local administration of mental health services was reinforced by legislation in 1959. Indiana, Maine, Minnesota, Oklahoma and West Virginia were among the States that authorized localities to develop community mental health programs or to use local tax funds for this purpose. A startling reversal occurred in Connecticut, where the State legislature voted to abolish county government and to transfer county governmental functions to the State by 1961.

Psychiatric Emergencies

Experimentation is underway in several places in the country to develop more effective procedures for handling psychiatric emergencies. A report was published in 1959 describing the experience of the psychiatric emergency clinic staffed by the Einstein School of Medicine at the Bronx Municipal Hospital. In this clinic, patients are seen on a 24-hour basis, and receive immediate treatment as well as referral. Emergency psychotherapy has been used for prompt intervention at the time of a crisis. Through brief, intermittent contacts, an attempt is made to maintain chronic patients in the community. Also, by providing immediate mental health consultation to social service agencies on psychiatric emergencies among their clients, the social service agencies have been more willing to cope with mental health problems. Using this approach, the clinic has been able to cut down the number of referrals for long-term psychotherapy.

In South Dakota, the Northeastern Mental Health Center has also been emphasizing emergency, short-term treatment and accepting most referrals. The emphasis of the clinic is on brief patient-contacts, the use of drugs, and a restoration to maintenance function.

In a different type of approach, the Butler Hospital, in Rhode Island conducts a home service program which sends nurses, social workers, attendants or housekeepers into the homes of patients during times of crises.

In Hagerstown, Maryland, the health officer learned that, in a three-month period 27 mental patients were taken by the police to jail to await hospitalization. The health officer then initiated an emergency service in which he gave reassurance and drugs to such patients. He found that about one-third of the patients could be managed without hospitalization and that it was not necessary to jail mental patients. Subsequent management consisted of visits by nurses, referral to a family physician or to the local mental health clinic.

The Division of Mental Health, Hawaii Department of Health, plans to develop a 24-hour emergency information and referral service for people in crisis situations. It will be used not only for severe mental illnesses but for crises resulting from severe physical illnesses, death, crime, accidents, intoxication and separation.

General Hospitals

The widespread and increasing use of general hospitals in the treatment of mental illness is undoubtedly one of the most significant developments in the last decade. Data from the Biometrics Branch, NIMH, indicate that admissions to general hospitals in 1955 were equal to admissions to State mental hospitals. In the last two years, admissions to Illinois State hospitals have decreased while psychiatric admissions to general hospitals increased 7 percent the first year and 14 percent the second year.

The Georgia legislature markedly increased the appropriation for the experimental Intensive Treatment Program in general hospitals from \$300,000 to \$500,000. A new psychiatric unit is expected to open at the Grady Memorial Hospital in Atlanta. The purpose of this program is to provide early diagnosis and treatment of the mentally ill in general hospitals in order to avoid prolonged hospitalization.

The Connecticut Department of Mental Health also has a program of State grants to local general hospitals. The appropriation for this program was increased from \$150,000 in fiscal 1959 to \$211,000 for fiscal 1961.

In Louisiana, the State Mental Health Authority is establishing three day hospital programs in the charity (general) hospitals. State mental hospital staff are participating with local staff in operating this service which is not yet fully staffed.

Other States in which significant progress is being made in the development of psychiatric services in general hospitals include Florida, Hawaii, Iowa, Mississippi, Nebraska, Puerto Rico, South Carolina, Texas.

Residential and Day Centers for Emotionally Disturbed Children

In several States new resident treatment centers for emotionally disturbed children are being established. The Esther Loring Richards Children's Center, Owings Mill, Maryland, was opened in 1959 with the goal of providing short-term, intensive therapy. The Iowa and Wisconsin legislatures authorized the construction of new resident treatment centers for children.

Experimentation with day-care treatment programs for children is spreading. Under a grant from the New York State Interdepartmental Health Resources Board, a pilot day care program for emotionally disturbed children is being instituted at the Henry Httleson Center for Child Research. Three mental health clinics in Connecticut (Bridgeport, Hartford, New Haven) are experimenting with day-care programs for severely disturbed young children, particularly autistic children. Federal grant-in-aid funds are being used by New York State to help finance a pilot project of the Godmother's League which is trying to determine the effects of outpatient and day-care facilities on the hospitalization of schizophrenic children.

The Tri-County Children's Center, New Jersey, is experimenting with combining the functions of a community mental health clinic with those of a specialized foster home for the treatment of four or five emotionally disturbed children. The emphasis of this service is on short-term therapeutic residence. Federal grant-in-aid funds are helping to support this project.

Commitment Laws

Among the States which made changes in their commitment laws during the year were Alaska, Connecticut, Florida, Idaho, Minnesota, New Mexico, North Carolina, Ohio and Washington. Idaho provided for commitment of mental patients to the State Board of Health instead of to a State hospital. This opens the way for the Board of Health to place mental patients in facilities other than mental hospitals, when appropriate. Minnesota revised its commitment law to provide for reports on patients from local welfare departments at commitment hearings in courts. This procedure would also permit consideration of alternatives to the mental hospital. As a result of the change in the commitment law in Connecticut, it is expected that legal commitments will decrease while voluntary admissions to the hospital will increase correspondingly.

Interstate Compact on Mental Health

Nine more States (Alaska, Arkansas, Indiana, Missouri, North Carolina, Ohio, South Carolina, South Dakota, Vermont) passed legislation in 1959 ratifying the Interstate Compact on Mental Health. A total of twenty-one States are now participating in this interstate agreement which was launched only a few years ago (1955). The Compact permits waiving of residence requirements in determining where mental

health services shall be provided for a mentally ill patient.

Mental Hospitals

Revolutionary changes are taking place in the care, treatment, and rehabilitation of the mentally ill. Voluntary admissions, the "open hospital" and "therapeutic community" concepts, and the tranquilizers are transforming many of our hospitals. Most important has been the more optimistic attitude about returning patients to the community and the emphasis on treatment rather than custody. Many hospitals in this country, of course, still are primarily custodial institutions which have made little progress in applying modern treatment methods.

The hospital's responsibility for the care and treatment of the mentally ill is being shared more and more by the community, the outpatient clinic, the general hospital, the general physician's office, and the home. Responsibility is being decentralized from the State to the locality.

The current popular emphasis on community alternatives to the mental hospital has sometimes been interpreted to mean that the mental hospital is an unfortunate place for the mentally ill. Some of the strivings to prevent patients from going into a mental hospital or to get them out of a mental hospital are not related to the needs of the patient or to how a mental hospital can help the patient. Increased educational efforts need to be made, both with lay and professional people, to increase the status and prestige of the mental hospital. Such efforts will help mental hospitals to attract high caliber staff.

Post-Hospital Services

Another big area of growth in community programs in the last decade has been the development of services for ex-patients from the State mental hospitals. Iowa passed new legislation in 1959 which initiated a program to provide foster home care to ex-hospital patients. State mental hospital funds will be used to pay for this care. Missouri passed similar legislation for a program focussed particularly on the aged and mentally retarded. Alabama initiated a foster home care program in Jefferson County. The Indiana legislature authorized the Division of Mental Health to place patients in approved county homes and to pay for their care from State mental health funds.

New York and New Jersey are using Federal grant-in-aid funds to help support demonstration projects in Fountain House programs. These are social rehabilitation centers for ex-mental patients, or non-residential "half-way" houses.

One of the most extensive and fast growing services in the field of community mental health is the provision of follow-up or after-care services by public health nurses or social workers for ex-mental patients who have returned to the community. In one type of organizational pattern, public health nurses in local health departments are used to provide the service. Alabama has a pilot after-care project

in three counties (Etowah, Jefferson, Tuscaloosa) using public health nurses. Georgia and Kentucky, Oregon, Washington are among the States that are extending follow-up services by public health nurses. North Carolina's pilot project in eight counties using local public health nurses has resulted in the demand for extension of this service to the entire State. The experience in this project has highlighted the demands on hospital staff to prepare reports and handle communications with the local nurses and has also indicated the need for regular consultation to the public health nurses from professional mental health staff.

Idaho is planning to develop a State-wide after-care program using social workers based at the State hospitals. Wisconsin is developing the use of State social workers in district offices for rehabilitation and after-care. Louisiana is planning to add social workers to all mental health guidance centers in communities to develop an after-care program. These social workers will be attached to clinic staffs but their salaries will be paid by the State hospitals.

Other ways of providing follow-up services are also being tried. As a requirement for receiving State grant-in-aid funds in Illinois, local community mental health clinics are required to accept conditionally discharged patients referred by the State hospitals. This arrangement is resulting in the closing of the State mental hospitals' outpatient clinics.

The Detroit Consultation Center, which originally operated as an intake and follow-up service for the retarded in relation to the La Peer State Home, has been expanded into a screening center for pre-admission services for both the mentally ill and the retarded. Also, the Center, which is staffed by a psychiatrist and several social workers, will provide outpatient clinic and follow-up services for mental patients discharged from the State hospitals.

In the Rutland After-care Project (Vermont State Department of Health) a psychiatrist has been employed part-time to visit the State hospital regularly and become acquainted with patients who will be discharged to the community. The psychiatrist also spends two days a month at the Department of Health's Guidance Clinic in Rutland, meeting with the ex-patients after discharge, supervising drug therapy, facilitating cooperative planning with other community agencies, and encouraging general practitioners to accept responsibility for these persons.

Accident Prevention

Relatively few State mental health programs are active in accident prevention. In conjunction with a poison control center, the Arizona State mental health staff are working on education of the public and on methods that may be used to handle families that are accident repeaters. Hawaii State mental health staff are attempting to develop tests by which accident-prone drivers may be identified. The Oklahoma Division of Mental Health is making a film on the emotional aspects of accidents. The Connecticut Department of Mental Health and the Department of Motor Vehicles in conjunction with the

Bureau of State Services, Public Health Service, are making a joint study of ex-mental hospital patients to determine whether there is any observable correlation between psychiatric disorders requiring hospitalization and involvement in motor vehicle accidents.

Aging

Developments in mental health services for the aged are characterized by their wide diversity. The Mental Hygiene Division and Hospital Division, Oklahoma Department of Health, and the University of Oklahoma School of Medicine are the co-sponsors of a plan to set up a geriatrics information center. A major goal of the information center will be inservice training for nurses aides and operators of nursing homes and rest homes. It is hoped that this center will be the beginning of an institute of gerontology for the dissemination of medical knowledge about aging.

This year Georgia became the first State community mental health program to employ full-time, State-level, staff specializing in geriatrics. The Minnesota Department of Welfare (the State Mental Health Authority) began a demonstration project for aged people living in a new housing development.

The Pennsylvania Mental Health Authority is helping to support a homemaker service for the aged which is being provided by a local family service agency in Scranton. In this project, in many cases the aged client has had a severe mental illness, and the placement of a homemaker in his home is considered as a way of preventing family breakdown and avoiding institutional care.

The Tennessee Department of Mental Health has been helping to support the Nashville Senior Citizens Center. The program of the Center covers community education about the aged, community action, training, research and direct services, including adult education, recreation, health education, counseling, information, and intensive work in restoration and rehabilitation of shut-in handicapped persons.

A private institution for the aged with an unusually broad range of services is the Menorah Home and Hospital for the Aged and Infirm (New York City), a voluntary organization. Menorah has 420 beds divided between "hospital" and "home" aspects. In addition to the usual facilities, physiotherapy, occupational therapy, and recreational services are provided. The organization has built special housing called the "Golden Age Dwellings" for persons or couples over 70 years of age. Also, it operates an outpatient, non-sectarian day center open to aged in the community. The Home also pioneer with the establishment of an outpatient psychiatric clinic called the Geriatric Guidance Clinic which serves people over 60 in the community. The clinic is considered as a research and demonstration project and has as its aims providing mental health assistance to the aged and attempting to ward off senility.

Many States are struggling with the problem of how to keep the non-psychotic aged out of mental hospitals. In the past year, in Kentucky an outpatient unit for pre-admission studies was established at Western State Hospital. This screening unit discourage and at times refused the admission to the Hospital of aged persons who, after diagnosis, were found to be non-psychotic. When it was found that persons did not need hospitalization, staff gave help to families and to agency workers in finding other appropriate resources or facilities.

In several States (e.g. California, Florida, Michigan, Nebraska, Wisconsin), State mental health programs or mental health associations sponsored workshop or training institutes on mental health for nursing home personnel.

Alcoholism

Activity in alcoholism programs gained momentum, particularly among public health personnel. Legislation in four States (Massachusetts, Ohio, Pennsylvania, Washington) made State departments of public health responsible for alcoholism programs. In Massachusetts and Tennessee, the independent alcoholism commissions were abolished and their functions integrated into the State departments of health. In Washington, the alcoholism program was transferred from the Department of Institutions to the Department of Health. In Ohio, the legislative action represented the inauguration of a new alcoholism program for the State.

Legislative action in Connecticut varied the pattern by integrating the Commission on Alcoholism into the State Department of Mental Health. The integration of alcohol programs into larger, older State departments, such as a health department or mental health department, suggests increased acceptance and a more stable future for alcoholism programs.

Another area of development is the increasing number of general hospitals admitting alcoholics (e.g. Florida, Louisiana, Michigan). Voluntary health insurance programs (Blue Cross, etc.) are beginning to provide coverage for alcoholism.

Federal grant-in-aid funds help to support the Willmar Alcoholic Follow-Up Clinic in Minnesota. Working out of the Willmar State Hospital and the Twin Cities Clinic, rehabilitative services are provided to alcoholic patients released from State hospitals. Clinic staff also are engaged in consultative and educational activities on alcoholism throughout the State.

Drug Addiction

Except in New York City, special State or local mental health services for drug addicts are relatively rare. New York took important steps in 1959 to strengthen its program for drug addicts. A State appropriation of \$300,000 was made to open a research facility on drug addiction at the Manhattan State Hospital. This research unit will combine laboratory, inpatient, and outpatient operations. Also, as of January 1959, New York City's Department of Hospitals accepted responsibility for drug addicts who commit themselves voluntarily. The Department of Hospitals may refer the patient to a mental health

clinic in a city hospital or may provide inpatient care. Riverside Hospital, which is also part of New York City's Department of Hospitals, continues to provide inpatient and outpatient care for drug addicts under 21 years of age. The New York State Health Department, State Mental Hygiene Department, and the New York City Community Mental Health Board contribute to the support of the program at Riverside Hospital. The P.H.S. Demonstration Center in New York City served a catalytic function in bringing together the leaders of the City's Agencies concerned with drug addiction.

California's legislature appropriated funds in 1959 for a new demonstration treatment program for narcotic prisoners at the California Institution for Men at Chino, near Los Angeles. This Institution is a minimum security, farm-type, penal institution. It is planned to provide a 40-bed intensive treatment unit, including group and individual psychotherapy, supervised work, and recreational activities, etc. After release from the Institution, follow-up in the community will be provided by parole agents.

The specialized narcotic clinics in Chicago and Detroit have been integrated into general outpatient psychiatric clinics. In Washington, D.C., non-criminal drug addicts are being committed to D. C. General Hospital instead of sending them to the PHS Hospital at Lexington, Kentucky.

Juvenile Delinquency

Mental Health programs are significantly involved in the problem of juvenile delinquency both through direct clinical services to the delinquent or potential delinquent and indirect services through consultation with schools, courts, police, welfare agencies and institutions.

The examples which follow are illustrative of mental health activities in the area of juvenile delinquency. In Indiana, the State Mental Health Authority is the Division of Mental Health in the Department of Health. The Commissioner reports that "many juvenile delinquents are cared for by hospitals and schools of the Division. Some are committed to our State Schools because of mental retardation; others to our State Hospitals because of psychiatric problems; and still others are received by us as transfers from correctional institutions. In addition many are seen for diagnosis and evaluation in the outpatient departments of our schools and psychiatric hospitals as well as in our child guidance and community psychiatric clinics."

The Michigan Department of Mental Health conducts a program for elementary school teachers to help them understand and identify early behavior that may lead to delinquency. It has been observed that teacher referrals usually come as the result of acting-out behavior and that teachers need help in becoming more aware of pre-delinquent behavior in order to make referrals to suitable services before the problem is well advanced.

The Ohio Department of Mental Hygiene and Correction operates a juvenile diagnostic center where all children committed to the Department are given psychiatric study prior to institutional treatment.

In the District of Columbia, the Department of Public Health provides a psychiatric team to serve the public schools in order to assure that no child is discharged into the community for a behavioral condition that might be remediable by psychiatric help and to provide consultation to teacher, principals, and counselors to enhance their skills in working with behavioral disturbances among pupils in the schools.

In Virginia the Department of Mental Hygiene and Hospitals operates a Mobile Psychiatric Clinic which examines most delinquent children committed to the State and prepares recommendations to the Child Care Bureau. It also conducts group therapy at each of the State training schools.

The Youth Rehabilitation Section of the Idaho Department of Health provides probation and parole services for juvenile delinquency cases, casework services to juveniles in the state Industrial Training School and consultation services to correctional institutions and community agencies. The staff of three social workers is to be increased by three additional youth counselors as a result of increased appropriations in 1959.

In Rhode Island, the State Institutions Clinic provides psychiatric and psychological services for the training schools for delinquent boys and girls. The clinic staff provide mental health consultation for the institutional staff and also conduct group therapy sessions for the children in the institutions.

The Division of Mental Health of the Texas Department of Health has just published a popular report of its pilot project to study the value of preventive mental health services to pre-delinquents and delinquent youth in Brazos County, Texas. In this project, a social worker provided consultation to the Juvenile Court and to probation personnel and also provided counseling services to pre-delinquent children and their families.

The Division of Mental Hygiene, Alabama Department of Public Health is participating in a joint undertaking with the Jefferson County Board of Mental Health, the Social Hygiene Association, Mental Health Association, and Juvenile Court to provide (1) mental health consultation to the Juvenile Court judge and staff, (2) training for parents of delinquent children, (3) group therapy for the children, (4) training of citizen sponsors (big brothers) of individual children.

The Mental Health Division, Hawaii Department of Health, has a diagnostic, consultative, in-service training and research program in conjunction with the Juvenile Court and Police Department. Consultation is provided to the probation counselor and staff of the Juvenile Courts to assist them in understanding the mental health implications of their cases. In addition, the Division assists the Police Department in the selection and in-service training of police officers.

Mental Retardation

Organizational changes in several States gave increased recognition to the importance of mental retardation programs. The New York State Department of Mental Hygiene set up an Office of Mental Retardation to develop and coordinate services for the mentally retarded. In New Jersey, the Bureau of Mental Retardation was moved up to the status of a division in the Department of Institutions and Agencies. Illinois set up a Section on Mental Retardation in the Mental Health Service of the Department of Welfare (the State Mental Health Authority).

By legislative action, the two previously independent State institutions for the mentally retarded in Connecticut were transferred to a newly organized Division of Mental Retardation in the State Department of Health. This new Division was authorized to establish diagnostic clinics and day centers for the mentally retarded.

The program of nursery centers for pre-school mentally retarded children, operated by the Massachusetts Department of Mental Health, continues to expand rapidly. Twenty-seven centers are now in operation over the State. The purpose of the program is to aid in the better diagnosis and evaluation of retarded children and to provide therapeutic services and training for future placement of the children in special classes in the public schools. Counseling for parents of the children is also part of the program. Delaware has a similar program with four day centers in operation.

The Ohio Division of Mental Hygiene is helping to support 220 community classes for mentally retarded youth excluded from public schools. State funds have been appropriated for an additional 249 classes in fiscal 1961. More than half of the funds for these classes comes from the local community.

In cooperation with the Western Interstate Commission on Higher Education, Pacific State Hospital, California, has established a professional training program in mental retardation. Training will vary from six months to a year, with programs for nursing, medicine, psychology and other disciplines.

Federal grant-in-aid funds are being used to help support an interdisciplinary training center on mental retardation at the New York Medical College, Flower-Fifth Avenue, New York City Hospital and a project at Yeshiva University for the training of teachers for special classes of emotionally disturbed and mentally retarded children.

In Illinois, Federal grants-in-aid funds are being used in a day care center for young retarded adults (Retarded Children's Aid, Hull House) and in a day program for both preschool and young adults mentally retarded (Peoria Council for Mentally Retarded Children). New Jersey is using Federal grant-in-aid funds to contribute to the support of the Retarded Children's Clinic of the Essex Unit of the New Jersey Association for Retarded Children and to the Retarded Children's Service of St. Mary's Hospital.

Federal grant-in-aid funds are also contributing to the support of Minnesota's Social Development Center for the mentally retarded. The purpose of the Center is to provide an intensive activity program for a group of young adult retardates functioning in the trainable range but too old to participate in special classes.

Mental Health in Schools

Work with schools continues as a high priority area for community mental health programs. In 1959, Kentucky appointed its first State-level school mental health consultant in the Department of Mental Health.

Connecticut used Federal grant-in-aid funds in fiscal 1958 to initiate a pilot project providing three social workers to the schools in nine small towns. In 1959, two additional towns and an additional school social worker were added; in 1960, twelve towns will be served by six school social workers. The local contribution of \$1,200 in 1958 has increased to \$17,000 in 1960. Furthermore, this program of the Connecticut Department of Mental Health will be terminated in fiscal 1961 as the result of new legislation providing for grants from the State Department of Education for this purpose.

Connecticut is also using Federal grant-in-aid funds to support a pilot project which is experimenting with a mental health clinic service for students at the New Haven State Teachers College.

In conjunction with Syracuse University, Montgomery County, Maryland, established special classes for children in second and third grades who were underachieving, hyperactive, emotionally disturbed. The teaching program consisted of high individualization of each child, removal of distracting stimuli (pictures, charts, etc), rigid scheduling of classroom activities, and a teaching program as concrete as possible. The children responded to the program and some have been able to rejoin classes of their own age group. As a result of this successful experience, in two other counties (Frederick and Cecil) the health and education departments have developed a similar joint program to provide diagnostic, teaching and follow-up services for exceptional children. The program includes "brain-injured", gifted "non-achievers" and children with other kinds of learning or behavior disorders.

The completion by California and New Jersey of school population surveys to identify emotionally disturbed children, followed by enabling legislation to provide new programs for these children, has stirred other State departments of education and mental health to explore this problem.

Schools are employing increasing numbers of psychologists and social workers, as well as psychiatric consultants. The National Defense Education Act's training funds for guidance have widely increased the number of school personnel studying "counseling and testing" under faculties trained in the behavioral sciences. The recent resurgence of interest in special educational opportunities for gifted children has led many educators to rediscover the high prevalence of emotional problems and of underachievement in the gifted school population. As a result

a new wave of research and use of mental health services has appeared. Alabama, Michigan, Massachusetts, Wisconsin, Texas, and California report new projects studying the mental health training of the teacher.

Manpower and Training

In 1959, Dr. Albee's report on mental health manpower was issued by the Joint Commission on Mental Illness and Health. The report was essentially pessimistic about the possibilities of developing sufficient professional mental health personnel to keep up with the needs of our growing population unless massive efforts are made in broad areas of education and sharp breakthroughs are made in research.

A report by the American Psychiatric Association indicated that some progress had been made since 1956 in increasing the supply of psychiatrists. Between 1956 and 1959 the number of psychiatrists increased 21 percent from 8,713 to 10,558. The ratio of psychiatrists to the general population improved from one psychiatrist per 19,000 population to one per 16,000. Over a third of the psychiatrists were working either full-time or part-time, in outpatient clinics, social agencies, or public mental health programs outside of mental institutions.

State mental hospitals are being used increasingly for residency training for psychiatrists. According to data from the American Psychiatric Association, between 1956 and 1958, 18 new three-year residency programs were approved in State hospitals and 264 additional residents were in training in State hospitals. Overall, about one-third of all psychiatric residents were being trained in State hospitals.

Throughout the country, efforts were being made to increase the supply of professional manpower. In Ohio, State funds were appropriated to support accredited training for about 300 persons representing all of the mental health disciplines. Other States with extensive training programs included Florida, Illinois, Indiana, Kentucky, Louisiana, New York, Wisconsin. A large proportion of the Federal grant-in-aid was being used by Indiana, New York, Wisconsin, for the support of professional training in community mental health. The stipend training program in Texas suffered a set-back in 1959 when the legislature made it impossible to use funds for this purpose.

At the Manhattan State Hospital, as a recruitment device, the New York Department of Mental Hygiene opened a graduate school of psychiatry for its medical personnel. The University of Minnesota initiated a new Ph.D. program in school psychology. The Department of Psychiatry at the University of Oregon and Eastern State Hospital in Washington launched a cooperative program of psychiatric education for hospital staff and medical students. The Puerto Rico Department of Health and the School of Medicine at the University of Puerto Rico have developed an accredited psychiatric training and research center for the training of the mental health professions. In Connecticut, the legislature authorized the construction of the "Connecticut Mental Health Center" in New Haven as a joint endeavor of the State Department of Mental Health, the Department of Psychiatry of the Yale Medical School, and the Grace-New Haven Hospital. This new training and research center will be operated by the State department and is to have a relatively large inpatient, outpatient, and day hospital service.

More than 60 physicians engaged in general practice met at Metropolitan State Hospital, California, to participate in an Institute on Psychiatry in General Practice. This was the first program of its kind to be held in California.

Research

A compilation made by the Council of State Governments indicates that in fiscal 1959, State mental health programs spent \$14 million for research. This included mental institutions, community mental health programs and research institutes. However, four States, (Illinois, Michigan, New York, Pennsylvania, accounted for three-fourths of these funds. Moreover, a relatively small proportion of these funds were being spent for research on community mental health services.

For the biennium 1960-61, Ohio has appropriated \$2 million for research, almost double the amount in the previous biennium. A new research unit is being activated at the Cleveland Psychiatric Institute and Hospital. In Iowa, funds were appropriated for the construction of a research building at the Psychopathic Hospital.

In Chicago, a new training and research center, the Illinois State Psychiatric Institute was opened in July, 1959. In Alabama, the Director of Mental Health is working with the Department of Psychology, University of Alabama to establish an Institute of Behavioral Research at the University.

Only a few States (e.g. California, Michigan, New York, Texas) have had State-level specialists in research. This year, research consultants were added to the State-level community mental health programs in Alabama, Georgia, and Hawaii. The California Department of Mental Hygiene assigned research directors to six State hospitals.

As an example of the States which have significant research programs, Minnesota has about 50 projects being carried out in or in conjunction with the mental health program of the Department of Public Welfare (the State Mental Health Authority), principally within the State hospitals. The range of research includes: deep electroencephalography, studies of fat metabolism, pathogenity of tubercle bacilli, dietary control of phenylpyruvic oligophrenia, comparison of day-school and traditional institutional programs for the mentally retarded with an integrated cottage-school program within the institutions, the response of mentally ill patients to ataractic medications, attempts to delineate the "therapeutic personality" and to gear psychiatric aide training programs in relation to this; identification of alcoholic sub-types.

The Southern Regional Education Board has underway a State by State survey of mental health research in the South. The survey is designed to get detailed information about the South's resources and needs in research in mental health. It will also provide data on research projects in progress and how they are being carried out.

A questionnaire survey of the Chief Psychologists of State mental health programs, made in July, 1959, indicated that they believed that the chief obstacles to research in their programs were: (1) lack of personnel, (2) lack of funds, (3) program emphasis on services with resultant lack of time for research.

Needs and Problems

In State Plans submitted to the PHS in conjunction with Federal grants-in-aid for community mental health services, every State reported significant gaps in its program. Of course no two States reported exactly the same needs, but listed below are needs reported repeatedly by the State-level community mental health agencies:

1. Inadequate funds, low salaries
2. Shortages of professional mental health personnel, particularly psychiatrists.
3. Geographical areas without mental health services, especially in rural areas.
4. Expansion of mental health education and consultation with non-psychiatric agencies and groups.
5. Development of services for the social problem areas, e.g. aging, alcoholism, juvenile delinquency, mental retardation, etc.
6. Development of after-care services for ex-patients from the state mental hospital.
7. Development of day-care centers and resident treatment centers for emotionally disturbed or mentally retarded children.
8. Development of training and research activities.
9. Coordination of mental health services at the local level and between the local community mental health program and the State mental hospital.

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NATIONAL INSTITUTE OF MENTAL HEALTH

COMMUNITY SERVICES BRANCH

BUDGET SHEET

Estimated Obligations for Fiscal Year 1960

Total :	\$1,473,000
Direct:	\$1,473,000

ANNUAL REPORT OF PROFESSIONAL SERVICES BRANCH, NIMH

CALENDAR YEAR 1959

The Professional Services Branch continued to fulfill its function in relation to program development activities, as defined in preceding reports, and to perform a variety of staff and consultation functions to the Office of the Director and the Institute as a whole.

The Branch was fortunate in adding Dr. Lauren G. Wispe' to its staff, as Senior Psychologist. He came on duty in August, and has already made significant contributions in discussions of various aspects of the program. He has not yet delineated a specific field of program development activities for his special attention.

Mrs. Denise Kandel has joined the staff for one year and is assisting Dr. Richard H. Williams in work in the field of rehabilitation.

Studies Concerned with the Prevention or Reduction of Disability in Pathologic or Deviant Populations

Rehabilitation

Dr. Ralph Notman, principal investigator, and Dr. Williams have continued to work on a book analyzing the Boston State Hospital Pilot Study in Rehabilitation and Rehabilitation Personnel. Progress has been slower than anticipated due to the necessity of making new studies of the patient population as a whole in order fully to understand what happened in the Pilot Study. However, it is felt that these special studies will greatly enrich the study as a whole.

Dr. Simmons and his group at the Harvard School of Public Health have made notable progress in a special study in which relatives of 650 patients, leaving mental hospitals in the Boston area and its hinterland, have been interviewed. It became necessary to request additional funds to assure a second wave of interviewing with this large group. These funds were enthusiastically approved by the Council at its meeting in November.

Feedback activities continue and, notably, a conference was held in New York City in which representatives of some 50 projects in the broad area of psychiatric rehabilitation met to discuss their common methodological and operating problems. Mrs. Kandel and Dr. Williams are currently analyzing material from the conference and other materials from these projects to write a book on problems of research and demonstration in the field of psychiatric rehabilitation.

Mental Retardation

The field of mental retardation has continued to make progress during the past year. There has been an increase in grant activities in research and training and increased concern by the fields of mental health, public health and medicine generally.

The various special grants supported by the National Institute of Mental Health have led to results which will have lasting impact on the field.

The grant made to the National Association for Retarded Children to do a study of the etiology of mental retardation resulted in a major report which was published early in 1958. This report has had a continued impact on the field. It has been quoted and requoted in scientific publications. Many applications for regular research grants have been directly stimulated by this work.

The American Association on Mental Deficiency project on "Technical Planning in Mental Retardation" continues to work in many areas. The abstract service of all articles relating to mental retardation continues to be published. It has also encouraged reviews and abstracts of foreign literature. Project newsletters reporting on activities by the project and in the field have been distributed widely to people within the field, and to those who have some part in planning programs for the retarded, such as legislators, school and mental health administrators. The project's work on improving the training and research relationship between universities and residential facilities has progressed so that several institutions and universities have utilized consultation from the project in developing improved programs. This work was reported in a publication entitled "Cooperative Program of Training and Research on Mental Retardation." The AJMD has become a better medium for communication. Dr. Leonard J. Duhl of the Professional Services Branch continues on the editorial board of the Journal. The Journal and the Association, as a result of this project's activity have opened a central office. Other activities of the project include studies of the legal status of the mentally retarded. Persons from other fields such as public health, education and law have been drawn into the activities of the American Association on Mental Deficiency project.

The research grant to Pacific State Hospital to study the impact of institutionalization of the mentally retarded has completed its second year. The measures of individual change that they hope to develop are moving along quite satisfactorily. Major cooperative relationships continue with the University of California at Los Angeles, the California Institute of Technology and the University of Southern California. In addition, a research relationship has developed between Pacific State Hospital and the University of Hawaii. This study is parallel to the one

that is currently active at Pacific State Hospital under the direction of Dr. Linus Pauling.

Dr. George Tarjan, principal investigator in the Pacific State Hospital project, has been very active in stimulating further research and program development through the American Association on Mental Deficiency, of which he is past president, the American Psychological Association, of which he is a counselor, the Group for the Advancement of Psychiatry, and other organizations. The close relationship between this Branch and the Pacific State Hospital has helped this activity. The Group for the Advancement of Psychiatry is publishing a report on mental retardation.

Cooperation continues with other agencies in Government, especially with the Office of Education. Dr. Duhl continues to consult in the field of mental retardation and research in education.

Juvenile Delinquency

Several special grant projects in juvenile delinquency have been under way during 1959, with Dr. Raymond Gould as the Branch liaison person. One project, at the South Shore Courts Clinic in Quincy, Massachusetts, concentrated in its pilot phase on developing a typology of a sample of 50 delinquents who came to the juvenile court in 1957. This typology was designed so as to be relevant for treatment purposes. The study included the design of an extensive schedule for accomplishing the social and psychiatric diagnostic study and has involved reliability checks on the observations of the psychiatrist by one or more other psychiatrists. It has also included a specification of the ideal treatment, the recommended treatment, and the actual treatment or disposition prescribed by the court, with predictions regarding the probability of recidivism in each instance. This group received a continuation grant of 3 years' duration in 1958. This continuation project involves enlarging the sample to permit more refined analysis and intensive follow-up so as to test the predictions and deepen the diagnostic understanding of the cases. Instruments for assessing physical health, for psychiatric diagnosis, psychological and social diagnosis have been designed and are being administered to a sample of 100 cases. The Clinic staff is also preparing a design for an experimental treatment phase on a community-wide basis, and will apply for funds for this purpose in 1961.

A second project, with Drs. Lippitt and Withey at the University of Michigan, has completed its pilot phase using a social psychological approach to develop a clinically meaningful typology of delinquents with a focus on the social situation of the child as well as on significant attributes of the child and his family. They have also conducted pilot investigations of significant agencies in the community, such as police, juvenile courts, social agencies, and schools, and are completing a study of a sample of Negro delinquents and of girl delinquents.

They have already been given support for demonstration or field experiment phase on a community-wide basis which will be under way in the coming year.

Dr. Isidor Chein has been supported in a small project to explore the feasibility of a large-scale delinquency and drug addiction control project in a high-delinquency area of New York City. Out of this exploration there has been developed a large-scale action project under the auspices of the Research Center of the New York School of Social Work at Columbia University, and of the Lower East Side Neighborhood Association in New York City. In November 1959, the National Advisory Mental Health Council approved support for a tooling-up or engineering phase of this project in which the action program for prevention and control of delinquency will be carefully designed, agency coordination will be accomplished, and the integration of research instruments with the action program accomplished.

A major new development at NIMH in the delinquency field has been the report to Congress which was requested by the Appropriations Committees of the House and of the Senate. The request was for "a most careful and thoughtful study of what can and should be done about delinquency in the future." This study has been the full-time concern of Dr. Gould, Mr. Cook, and several full- and part-time NIMH staff members since the spring of 1959. They have been assisted in the preparation of extensive working papers by the staff of the Judge Baker Guidance Center and the Thom Clinic of Boston and the South Shore Guidance Center of Quincy, Massachusetts. In addition, Dr. Nicholas Hobbs of Peabody College made a short visit to France in order to investigate French methods of delinquency control and training of delinquency personnel which were reported as being highly successful. Judge Mary Conway Kohler of New York City has also given valuable consultant service to this project and will contribute a paper on European programs and on community organization methods in New York City and other parts of the United States. NIMH collaborated with the Children's Bureau on this report, and expects to submit it to Congress on February 1, 1960.

Dr. Gould presented a paper before the National Education Association Conference on Delinquency in the Schools, in June, on the subject "Delinquency and the Future." He also presented a paper at the Massachusetts State Public Health Conference on "Introduction to Social Pathology." This was delivered in September. He also has a paper on "Delinquency and the Future" which is to appear in the Winter 1960 issue of the Journal of Public Law of Emory University.

Alcoholism

The Branch is continuing its work in this important field. During last year three special grants were made. Two of these were made to the North American Association of Alcoholism Programs. One is for a five

year period and centers around the important problem of nomenclature. There is need to develop an appropriate terminology in the field, one which can be used effectively for research and diagnostic purposes.

The second North American Association of Alcoholism Program's grant is a major effort to review systematically what is known and what needs to be known about alcoholism. A Cooperative-Commission has been established to undertake this task. Under the general direction of the Commission a scientific director will be in charge of the work. It is anticipated that several of the specific research projects will be performed by task-force directors; other projects will emanate from the scientific director's office, and still others will be completed by scientists not directly related to the Commission, but nevertheless stimulated by it to apply for regular grants.

The third special grant was made to the California State Department of Public Health. The two purposes of this grant are: 1) to develop instruments for measuring the incidence and prevalence of normal alcohol usage patterns; 2) to provide epidemiological information about the nonpathological use of beverage alcohol. In the process it is likely that social definitions of alcoholism will be derived, especially as they reflect the attitudes toward drinking.

Work has continued in the study of the values and habits of various ethnic groups in Colorado in relation to alcohol usage. Dr. Thomas Gladwin of the Community Services Branch continues to act as liaison.

The Branch, in cooperation with the Division of Special Health Services, has started planning for a series of small working conferences devoted to the general problem of automobile accidents associated with drinking alcohol. Each conference will be concerned with a particular aspect of the problem: e.g., psychological and physiological effects of alcohol consumption; enforcement, detection, and legal aspects; driving-drinking mortality and morbidity statistics, education and mass motivation; and social-psychological factors. When this series is completed, the various findings will be brought before a major national conference scheduled to be held in March 1961.

Suicide

The Branch is aware of the need for program development in this field and is currently engaged in the necessary background work. The literature is being reviewed and specialists in the field are to be consulted.

Studies of Fundamental Processes Affecting the Mental Health of
Populations of Entire Communities (Local, State and National)

Communication of Mental Health Concepts

The major study of communication of mental health concepts, under the direction of Drs. Nunnally and Osgood at the University of Illinois, is nearing completion. The final report has been submitted in manuscript form for publication.

Child-Rearing Practices and Beliefs -- The Parental Role

The study of factors influencing parents' values, beliefs and practices with respect to child training, under direction of Drs. Sears and Schramm at Stanford University, is well under way. Data have been assembled concerning where parents get information about child rearing. There is evidence that many practices are subject to change by indirect and non-combative techniques if introduced at the proper time. Significant differences are found to exist between socio-economic classes. There are more organized systems of values about child-rearing than were previously thought to exist.

In the study of the personality developments of 97 adopted children, being conducted under the direction of Dr. Leon Yarrow in the Greater Washington Area with the cooperation of six social agencies, data collection and analysis are continuing. Data appropriate to new developmental levels are being obtained in assessing the childrens' capacities to cope with environmental demands and stresses within and outside the family. Peer relationships are being studied through direct observations in natural groups (nursery schools) and in experimentally created groups. The impact on the child of adoption as a social reality is being explored, particularly its implication for his self-image and for his developing sense of identity. A comprehensive review of the research and theoretical literature on deviating conditions of maternal care--institutionalization, separation, multiple mothering--has been made by the principal investigator. This analysis is pointed toward the selection and definition of the significant variables for research on the effects of early environmental influences on personality development.

Aging

A fifth wave of interviewing has been completed in the Kansas City Study of Social and Psychological Aspects in Successful Aging, under the direction of Dr. Henry of the University of Chicago, and a sixth wave is under way. Beginnings have been made in drafts of sections of the final report and several papers have been read at scientific meetings.

An edited draft of the manuscript of a book reporting the Study of Retirement by the late Else Frenkel-Brunswik and staff at the University of California, has been completed.

The Study of First Admissions to Mental Hospitals in San Francisco, under the direction of Dr. Simon and Mrs. Lowenthal, has made notable progress. Some 400 cases have been studied to date and a parallel study of persons of similar background, remaining in the community, has begun.

Dr. Williams has cooperated with an international group in preparation for an International Research Seminar on Social and Psychological Aspects of Aging in Relation to Mental Health. A planning meeting, which Dr. Williams chaired, was held in Ann Arbor in November, in which four Europeans participated. The Seminar itself will be held in Berkeley, California in August 1960.

The Utilization of Space

The Branch continues interest in the physical and social environment as it relates to mental health, through meetings of a group of informal consultants from various disciplines. Out of discussions in this group have arisen several projects which we have supported. For example, a study of the West End, an urban slum community in Boston, is being made to determine the impact of the crisis of slum clearance upon the population. Results are suggesting the kinds of services required to aid in resolving such crises. In addition, this project offers the opportunity for a community laboratory for training persons in public health and community psychiatry. It is interesting to note that people in the field of planning look to this project as the main study in the United States dealing with urban renewal.

Other Areas

Interest has continued in the fields of creativity and of the logistics of mental health services, but no specific activities have been initiated in these fields. However, a paper, "The New Face of Mental Health," dealing with this subject, was presented by Dr. Duhl at the Detroit Regional APA meeting.

Studies of Fundamental Processes Affecting the Mental Health of Specific Populations in Organizational Settings

Mental Health in the School

Continuing the Branch's interest in the problem of mental health in the school, the Branch has added a further project in this area to those that they had been supporting. The project at the Bank Street College of Education, addressed to the question of the interrelationship

between the total social institution of the school and the individual student has been progressing to the point where preliminary findings and new methodological tools are available. The study at Harvard College of the interrelationships between the college and the student during his four years of attendance is well under way. Some understanding of the support available to a student will become more evident from this study. A search is being made of the mechanisms a college has available to allow the student to find a better level of adjustment. The basic thesis of this project is that the student, in the period of adolescence, is faced with a crisis which, in its resolution, offers potential for reintegration of his ego at a much higher level. The new grant in this area is to the University of Michigan to develop a study of the college. Comparisons of this State institution can be made with Harvard and other schools currently being studied. The result can be improved mental health and improved creativity. In this particular work in college mental health the NIMH has continued to cooperate closely with the Social Science Research Council Committee on Adolescence, with the Office of Education's Commissioner of Research, and with other groups concerned with this same problem. Various people doing work in this field are increasingly being brought together so that comparable methodology can be used and data obtained.

Preliminary negotiations for the development of a new program of residential treatment programs for disturbed children have continued. It is hoped by means of this work that we will get a clearer picture of what might be available to us in making our limited resources available to a greater number of people in this and other mental health areas.

Work in these areas has led to increasing concern with the needs for basic research in the behavioral sciences for the field of education. Many of the areas of basic concern to mental health have more general application to education. In this context, Dr. Duhl has been consulting with the Office of Education on the planning and development of their research program.

Mental Health in Work Groups

The project under the direction of Dr. Chris Argyris of the Department of Industrial Administration at Yale University was designed to investigate the observation that the needs of the individual worker tend to be in conflict with the needs and policies of the work organization, and to conceptualize and develop measures for optimum mental health of the worker. This study was completed during 1959 and is to result in a book and in articles in several journals such as The Administrative Science Quarterly. A follow-up study is being designed by Dr. Argyris.

The study directed by Drs. French, Kahn, and Mann at the University of Michigan developed a theory of the dynamics of work organizations which was expressed in a book-size report to NIMH which

was received in the spring of 1959. As was anticipated, this study resulted in the submission of several applications to NIMH for the support of specific research projects. Three of these, one on the effects of automation and the other on the effects of role conflicts, and one on the mental health problems of shift work were approved as regular grants during 1959, and other applications, one in the area of psychosomatic illnesses which appear to be brought on in the work situation, are pending. Dr. Gould continued as liaison with projects in this area. An article of his, on the strategy of industrial mental health research, appeared in the spring of 1959 in Adult Leadership. He is also preparing a paper for a TVA conference on industrial morale which is to take place early in 1960. Informal relationships have continued between the research workers in these projects and those in the area of college mental health.

Studies of the Mental Health Aspects of Traumatic or Stressful Events in Various Populations

Disasters

No new activities were begun in this field during the past year.

Epidemics

No new activities were begun in this field during the past year.

Accident Prevention

The Branch has continued its activities in accident prevention. The assignment of a staff member, Dr. Bernard H. Fox, to the Accident Prevention Program, BSS, continues. He performs several functions in the Program, such as conducting research, giving government and private agencies consultative and technical advice in the behavioral sciences, and acting as liaison among the Program, the Branch, DRG, and DGMS in several areas. Particularly, projects to which, through him, the Branch has contributed in 1959 are the following: (Completed): (1) Automobile Driving Simulator Feasibility Study; (2) Revised report of the Williamsburg Conference, which then appeared in a study made for Congress by the Secretary of Commerce; (3) Medical Guide for Physicians in Determining Fitness to Drive a Motor Vehicle (an A.M.A. publication); (Current and ongoing): (5) Seat belt campaign; (6) Connecticut Mobile Screening Unit project; (7) Conferences on Alcohol and Traffic Safety (which involve contributions by Branch members Dr. L. Duhl, Dr. B. Fox, and Dr. J. Fox); (8) Effect of Educative Treatments on Attitudes and Accident-Violation Experience of Adolescent Violators; (9) A study on the effect of drug therapy on accidents which the Psychopharmacology Service Center is contemplating; (10) the former Ad Hoc Accident Prevention Study Committee, now the permanent Accident Prevention Study Panel, involving staff activity, including site visits and NIH-BSS liaison; and other projects.

It is of interest that Dr. James L. Goddard, former chief of the Accident Prevention Program, has become Civil Air Surgeon of the Federal Aviation Agency and has been replaced by Dr. Paul V. Joliet.

Establishment of Research Settings

The Branch has continued to work slowly toward the development of community laboratories which would be useful in testing hypotheses or applying findings developed in the various areas mentioned throughout this report.

Other Activities

During 1959, Dr. Gould increased his activities as a liaison with the field of social work, particularly in the research area. He served on the Board of the Council on Social Work Education and on the Research Committee of that organization. In December 1959 he addressed the National Conference of the American Public Welfare Association on delinquency and public welfare. He also served as the secretary of the Executive Committee of the Research Section of the National Association of Social Workers, on the Commission on Social Work Practice of that organization, and on the Executive Committee of the D.C. Chapter of the National Association of Social Workers. He also had some contacts with social work organizations which were preparing to submit research applications.

The report of the Research Committee of GAP, Some Observations on the Use of Controls in Psychiatric Research, for which Dr. Williams served as editor and consultant, has been published and has been very well received. Dr. Williams has completed the draft of the report of the Subcommittee on Tertiary Prevention of the American Public Health Association's Program Area Committee on Mental Health. Dr. Duhl has continued to work with the APHA, GAP, and other groups.

The Branch has continued its close liaison with other parts of the Institute.

Permission has been granted for a Special Grants Review Committee on a permanent basis and such a Committee is now being organized. Also, it is planned to have the Planning Committee of the Council plus some ad hoc members to serve as a program development review board. These steps should strengthen the activities of this Branch in the future.

Conclusions

Although a few new activities have been undertaken, notably in the field of alcoholism, the main efforts of the year have followed the suggestion of last year, and concentrated on consolidation of work already in progress. The importance of the interpersonal and societal matrices within which problems of mental health and mental disorders develop is being increasingly recognized and explored in greater detail. Progress is being made toward the development and understanding of procedures which will help to prevent many deficits and disabilities and overcome others.



PUBLICATIONS AND REPORTS SECTION

Annual Report for Calendar Year 1959

During 1959, in addition to regular and continuing public information and public education activities, the Publications and Reports Section carried on a number of important special projects.

For Mental Health Week (April 26-May 2), which is cosponsored by NIMH and the National Association for Mental Health, P & R prepared and distributed approximately 1500 Mental Health Week kits to mental health associations, civic and service organizations, national women's organizations, and other voluntary groups interested in promoting mental health activities and furthering the goals of the national mental health program. These kits were made up of informational and educational leaflets and pamphlets, program suggestions, and other materials specially prepared by P & R to interest and inform citizens everywhere about the needs of the mentally ill and the part that they must play in meeting these needs. In connection with Mental Health Week also, P & R collaborated closely with the public information and education sections of the National Association for Mental Health and assisted in providing information and suggestions for publicity via Advertising Council campaigns, radio and TV shows, magazine articles, etc.

A major P & R program during 1959 was providing assistance, on request, to State mental health programs in developing reports on pilot and demonstration mental health programs. A writer-consultant on the P & R staff assisted one State in preparing three pamphlets describing special school mental health, juvenile delinquency, and mental patient rehabilitation projects. These reports and pamphlets will help make available to other communities and States the experience and knowledge derived from pilot mental health programs.

P & R has been active in promoting the development of standards for communication in the field of mental health education and in pioneering, along with other groups, in the difficult field of evaluation of such activities. During 1959, the Information Officer participated as a resource conferee in a special workshop on interpreting a mental health program via the mass media. This conference, sponsored by the Northeast Governments Conference on Mental Health, brought together program heads and information people from the mental health departments of the 10 Northeastern States. Arising out of these activities, and out of the expressed need of personnel responsible for information activities in the State mental health programs, P & R began, during 1959, to explore ways and means of improving communications among the various State information officers, and of working toward a national conference devoted to a discussion of their problems.

Cooperation with the Mental Health Materials Center, a non-profit organization devoted to the development and dissemination of program materials for use by operating mental health agencies and health education groups, resulted in wide circulation of mental health informational materials to pertinent groups and organizations. The Center provides some 2500 such groups with critical analyses of specially selected mental health materials and advises on how they may best be utilized. Several NIMH pamphlets and reference guides, prepared by P & R, have been selected by the Center's professional advisory board for inclusion in their kits. The Mental Health Materials Center reports that on a recent questionnaire of utilization of materials which they distribute or notify their members about, an overwhelming majority of respondents replied that they find the NIMH Reference Guides and lists of publications extremely helpful and useful and that they use them very widely.

Pressures of work and a reduction in writing staff resulted in a sharp curtailment of preparation of popular pamphlets over last year. However, during 1959 all of the Reference Guides and the general reading list were revised. The pamphlet entitled Facts About Mental Health and Mental Illness was partially revised and Psychiatry at Work, a reprint of a speech by the Director, was also issued as a pamphlet and distributed. New publications included PHS Publication No. 659, Highlights of Progress in Mental Health Research for 1958 and the fourth issue of the Mental Health Memo. Text for an entirely new edition of the pamphlet on NIMH was also completed during the year. The member of the P & R staff assigned to speech writing for the Director prepared twelve presentations for him.

A number of important press activities were carried on during 1959. These included: handling press relations and managing the press room for the 25th anniversary meeting of the Society for Research in Child Development which was held at NIH in March; assisting at the press room of the annual meeting of the American Psychiatric Association in May; participating in preparing materials and making other arrangements for the press conference held by the Secretary of HEW in April on the subject of mental illness. The background statement for this press conference was published as an article in Public Health Reports. Press releases during the year included one on the subject of alcoholism on the occasion of the award of a new \$1,000,000 five-year grant in this field, and another release on grants in the field of psychopharmacology.

There was continued active interest among newspaper and magazine writers as well as radio-TV writers and science writers in all areas of mental health and mental illness. Hardly a day passed without press inquiries of one kind or another. Often, writers submit their manuscripts for review. Interviews with and assistance to reporters and other writers have resulted in important articles, including:

Articles in Scope Weekly on the emergency psychiatric care project in Boston (an NIMH grantee), the art therapy and the family psychotherapy projects at the Clinical Center (NIMH Adult Psychiatry Branch.)

Articles in the Washington Post and the Evening Star on the NIMH Clinical Neuropharmacology Research Center, family and biological studies on schizophrenia, the work of the NIMH Child Research Branch, basic research, and the NIMH interdisciplinary study of aging.

Story on the general practitioners' training program in Medical Economics.

Article on NIMH programs and activities in Factor, a new medical newspaper for the GP on psychiatric factors in general medicine.

CBS Conquest documentary on the work of an NIMH research grantee.

Articles on suicide, including information about work of an NIMH grantee in this area, in American Weekly and Newsweek.

Article on retardation in Saturday Evening Post.

Article on adaption in Look.

Article on psychiatric wards in general hospitals in Good Housekeeping.

Article on mental health gains in the Wall Street Journal.

Articles on growth and tensions in Parents.

Articles on an NIMH research project on stress in the New York Times and the Baltimore Sun.

Article on the NIMH family therapy study in the Milwaukee Journal.

Article on mental illness and aging in Changing Times.

Article on foster homes for mentally ill in Clubwoman, monthly journal of General Federation of Women's Clubs.

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Other significant communication activities include:

1. Weekly reports on program and research developments for the information of the Surgeon General and the Secretary.
2. Replies to Congressional inquiries on major policy and program questions related to the work of the Institute and the needs of the mental health field.
3. Developing guidelines and providing assistance in the preparation of the NIMH Annual Report of Program activities.
4. Writing draft messages to special conferences and for special occasions for the signature of NIMH professional staff, the Director of NIMH, the Surgeon General, the Secretary of the Department of Health, Education, and Welfare, and the President of the United States. Such occasions include Mental Health Week, World Health Day, Youth Fitness Week, Caribbean Conference on Mental Health, special conference on alcoholism, 50th Anniversary Banquet of NAMH, etc.
5. Background statements for the Secretary and key PHS officials on special programs of the NIMH-- in alcoholism, psychopharmacology, community services, drug addiction, etc.
6. Background statements on care and treatment of the mentally ill, on the future of the mental hospital, and on latest developments in mental health research for use by key Government officials.
7. Background information and special reports for use by members of Congress, officials of the American Psychiatric Association, and the National Association for Mental Health in presenting the needs of the mental health field to interested individuals and groups.
8. Background information for the White House Conference on Children and Youth.

9. Special editorial and consultative assistance in connection with the American Journal on Mental Deficiency, a report on Federal resources in mental health to be published by the Joint Commission on Mental Illness and Mental Health, and a forthcoming monograph on the NIMH Interdisciplinary Study on Aging.

The NIMH Film Library was closed as of March 31 and prints of films on hand were turned over to the State Mental Health Authorities. This action was taken since the purposes of the Film Library--i.e., to demonstrate the use of mental health films in mental health education add to stimulate and develop their use by State and local mental health programs--have been largely achieved.

During the year, three new exhibits were prepared: One, a program exhibit, is entitled A Federal Program for the Nation's Mental Health. The second, Mental Health is Your Responsibility, is intended for use with educational groups and is adaptable for general meetings. It is a large exhibit which stresses the fact that although mental illness may require the care of specialists, mental health is the responsibility of many individuals and organizations both in and out of the field of mental health. This exhibit was completed in time for use at the biennial meeting of school administrators in Atlantic City in February. It was also used at the NEA annual meeting and meetings of National Congress of PTA, the World Confederation of Organizations of Teaching Professions, and the American Public Health Association. The third new exhibit, Expanding Horizons--Mental Health, was a table-top exhibit designed especially for the 1959 National Conference on Social Welfare. In addition to these three new exhibits, the small table-top exhibit entitled Mental Health was revised. During 1959 work was begun on a new professional exhibit depicting the clinical research methodology in the joint NIMH-Saint Elizabeths research center. This exhibit is intended for showing first at the 1960 American Psychiatric Association meeting.

During 1959 NIMH exhibited at 17 meetings which were attended by approximately 42,500 people and at which an estimated 33,000 pieces of mental health literature were distributed. The conventions included American Association of School Administrators, National Conference on Social Work, American Public Health Association, Association of Supervision and Curriculum Development, National Education Association, National Congress of Parents and Teachers, Council on Social Work Education, and American Personnel and Guidance Association.

P & R provided consultation on mental health films to various members of the NIMH staff. One such activity included the preparation of a list of twenty films of special interest to members of PTA's.

Work on the new film catalogue was largely completed during 1959 and a report was prepared on the survey which was conducted as part of the selection process for choosing titles to appear in that catalogue.

Other important information office activities included:

1. Answering inquiries of persons other than the press, magazine, radio and TV personnel. During 1959, the Section answered 5,358 requests for information by sending materials. Written replies, which often require some researching for data, average about 50 letters a week. These latter are the kinds of inquiries for which no published information is available for distribution. In addition, there are countless telephone calls--people who are distressed and asking advice for themselves or members of their families, college students, other Government offices, and organizations of all kinds.
2. Arranging for special interest groups and individuals, including foreign journalists, to tour mental health research areas and talk to NIMH scientists.
3. Addressing special interest groups on the work of NIMH--e.g., social legislation conference groups, county officials' meetings, annual meeting of recreational therapists.
4. Screening new mental health pamphlets and articles prepared by outside individuals and organizations, and selecting important new materials (purchasing reprints or reproducing copy with permission) for inclusion in the P & R collection of mental health literature for distribution in response to public inquiries.
5. Planning and supervising distribution of important new mental health publications.
6. Planning the distribution of Mental Subnormality, the Basic Books edition of the Masland-Sarason-Gladwin report on mental retardation which grew out of a joint NIMH-NINDB grant to the National Association for Retarded Children.
7. Selected P & R staff attended the two seminars for information officers held by the Communicable Diseases Center, Atlanta, Georgia, during 1959.

RESEARCH GRANTS AND FELLOWSHIPS BRANCH
Annual Report for Calendar Year 1959

I. PROGRAM GROWTH AND DEVELOPMENT: THE ADMINISTRATIVE PICTURE

Although the growth of the grant program has continued with the same unremitting velocity which has characterized the past four years, events during 1959 have gradually made feasible a greater degree of administrative integration and coordination than has heretofore been possible. Before examining these changes, a comparative glance at the numbers of grant applications reviewed will indicate some of the mounting pressures which the NIMH research grant program has sustained -- a type of pressure which, of course, has been experienced in most of the extramural grant programs of the National Institutes of Health.

During calendar year 1959 an over-all total of 1,195 mental health research grant applications was received, compared to 822 in 1958, 683 in 1957, 457 in 1956 and 260 in 1955.* Of these 1,195 applications received, 586 were recommended for approval -- a little under fifty per cent. Of the 644 new applications received in 1959 (exclusive of small grant applications), 293 (45%) were recommended for approval. The previous year only 188 (40%) out of a total of 469 new applications were recommended for approval. The rate of approval for new applications in 1959 thus was slightly higher than in 1958.

Program Administration

Although in the perspective of the administration of a twenty-five million dollar program the shortage of both professional and supporting Branch staff is still acute, the year 1959 did bring with it a degree of administrative stabilization. The return to Branch duty of one experienced staff member, who had been on training status for nine months, was of very considerable help in relieving the Branch Chief of much of the

*These figures refer to applications received in time for consideration during the annual year by the National Advisory Mental Health Council. They include all "regular" research, psychopharmacology, career investigator and small grant applications, and exclude mental health project grant applications and the Institute's "special" grant applications. They cover new applications, requests for supplements and requests for continuation beyond commitment. They do not include annual requests for continuation within commitment, which are not brought before the Council.

day-to-day work load of program administration. The addition towards the end of the year of both an Administrative Officer, as well as an additional psychologist to assist with the administration of the grant program, has already proven a sound step. During the summer a public health research analyst joined the staff with special duties in program analysis. Improvements in categorical and statistical analysis of the program are already underway as a result of this appointment. Strengthening of supporting fiscal staff in the Grants Administration Section has improved the availability of patterns of fiscal information on the grant program.

Heavy requirements in the first half of 1959 with respect to the preparation of budget justifications and special programmatic statements for fiscal purposes made serious inroads on the availability of professional time for necessary long-term program analysis and program development activities. Such budgetary demands also affected the time available for recruiting additional professional staff. The problem of lack of space for additional staff is still crucial at the close of the year, and shows little promise of solution in the near future.

The shortage of professional staff has been particularly evident in the limited time available to the present staff for contact with grantees, with key research investigators in the mental health disciplines, and, in general, for keeping abreast of proliferating research developments. Nevertheless, staff members attended meetings of a number of the major professional and interdisciplinary organizations which engage in mental health activities, including annual and regional meetings of both the American Psychiatric Association and the American Psychological Association, meetings of the American Orthopsychiatric Association, the Southern Regional Education Board, the American Anthropological Association and the Group for the Advancement of Psychiatry. Departmental visits, as well as site visits on particular grants, were heavier than in the past year, and provided a steadily increasing fund of information on the state of mental health research programs throughout the country.

Program Analysis and Program Development Activities

Despite the staff shortage which has affected all Branch activities, steady gains were made during the year in program analysis and program development activities.

The Grant Classification Program. During 1959 the Institute supported over eight hundred research grants -- in psychiatry, sociology, psychology, anthropology, biochemistry, neurophysiology, and at least a dozen other disciplines and sub-disciplines. To reduce this massive bulk of information to a form in which greater program visibility can be obtained has been one of the major needs in Branch program analysis.

A primary emphasis in 1959 program analysis activities was therefore placed upon the standardization of a classification system for the entire body of NIMH research grants. Codes were devised for recording over 1,200 separate units of information descriptive of the content, methods and setting of the grant-supported research projects, which now total over 3,000. The major areas covered by the coding system include:

- Disorders studied
- Clinical goals of the research
- Types of care, treatment and rehabilitation investigated
- Organic and psychological processes studied
- Social institutions and groups studied
- Types of subjects used
- Methods of research
- Sponsoring institutions and departments
- Other institutions supporting research
- Disciplines and training of investigators
- Field of research
- Utility and general aims of the research

Within each of these areas of information, the coding system provides for a variety of specific data. By recording hundreds of items for each project, it will be possible later to sort and combine "bits" of data in ways permitting a variety of analyses of the over-all program.

The coding system was tested in trial runs by a team of coders, and some revisions were made to insure adequate reliability. The initial body of data being codified consists of all those projects (822) which received NIMH support during the fiscal year 1959. To date six hundred projects have been processed.

The problem of recruitment and training of coding personnel continues to be arduous. The task of reading, analyzing, and codifying grant applications, study section reports, reprints and progress reports,

requires personnel of a fairly high degree of training, yet who are willing to spend considerable time performing a relatively routine chore. In addition, training staff to use the coding system reliably is time consuming, and imposes a necessary delay in the progress of the work. A staff of eight coders, assembled during the summer, was composed of graduate students in psychology and sociology. All but one terminated their employment after the three summer months to return to their universities. Four coders, however, have now been employed on permanent status and additional coders are being recruited.

In November sample items from the classification scheme were analyzed for five hundred projects, and the data were presented to the National Advisory Mental Health Council. These preliminary analyses also serve as a basis for further refinement of the system.

Arrangements have now been completed with the Statistical Processing Section of NIH to store the coded data through the use of punch cards. High speed electronic data processing machines will be used for analysis purposes. With the completion of the coding of fiscal 1959 research, the coding of 1960 research will begin. It is hoped that within time all past projects may be codified in the same way, thus permitting statistical analyses of the history of the program.

The Foundation Survey. Over a year ago a national survey of private support for research, training and service activities in disciplines related to mental health was launched in the Branch. It has now reached the final stages of analysis. Of those 1,100 foundations throughout the country which were surveyed by questionnaires and, in some cases, by interview, about 150 have been found to offer support on a national level for mental health activities. Detailed information on the assets of these organizations, on the type and amounts of support available, and on their methods of program stimulation, review and assessment has been gathered. The over-all results of the survey, which will include both a substantial analysis and a descriptive listing of the foundations, are expected to be ready for publication early next year.

Priority Areas. In other long-range program development activities the Branch has been concerned with the problem of the identification and development of priority areas of research. From the start of the grant program the Branch has employed a variety of methods of program development in areas which have been felt to be particularly important to problems of mental illness and in areas which have appeared likely to yield valuable scientific returns to both basic and applied research. The Mental Health and Behavioral Sciences Study Sections, which have reviewed the bulk of the mental health research grant applications, in earlier

years took some initiative for the initiation of research conferences to examine particular areas of research. The weight of reviewing mounting numbers of research grant applications in part has been responsible in recent years for a curtailment of such activities in the study sections. With the establishment in the Division of Research Grants during 1959 of two additional study sections, whose major workload is also concerned with mental health grant applications, and with a narrowing of the range and number of grant applications reviewed by each of these four study sections, it may be hoped that the study sections will still be able to make a contribution to program exploration and review in mental health research.

A primary responsibility for the continuing survey and development of the research in the whole field of mental health remains, however, in the Branch. During 1959 a detailed study of past problems in priority areas of research was completed and is to serve as a basis for a reconsideration of the whole subject. From this study of past experience there clearly emerges the fact that the major responsibility for the identification and development of priority areas cannot be left to the study sections or the Council. It is hoped that the newly established Planning Committee of the Council may be able to serve as one focus for the consideration of development activities of a number of Institute programs. The Branch priority areas study indicates, however, that the Institute's valuable advisory bodies have not in the past been able to find the time for sustained, reflective consideration of this thorny subject, nor has there been the necessary follow-through in the advisory bodies which only staff time can furnish.

No over-night solution to the problem of priority areas can be expected, but the Branch is actively engaged in consideration of this aspect of the research grants program and improved approaches are expected to be developed in the near future.

The Small Grant Program

The NIMH small grant program is now in its fourth year. During 1959 the Executive Committee for Extramural Affairs recommended that the National Institutes of Health small grant program be incorporated into the regular grant program but that the mental health small grant program be permitted to continue independently. The success of the mental health program in contrast to those of other institutes may relate in part to the fact that NIMH was the only institute to set up a special committee for the review of applications for small grants, rather than placing this special review function on the study sections.

The program continues to grow, although more slowly than during its first two years. From October 1958 to October 1959, the Mental Health Small Grant Committee reviewed a total of 270 applications as compared with the previous yearly average of around two hundred. It recommended approval of 111 and disapproval of 159 applications, resulting in an over-all approval rate of 41%. A total of \$225,289 in small grants was recommended for approval and paid in 1959.

Probably the most basic problem faced by the committee is that of maintaining a high critical standard of review, while still adhering to the original philosophy of the program: to provide rapid and flexible support for exploratory and pilot studies, to aid promising young investigators and to stimulate research in institutions with little research experience. In an attempt to evaluate the effectiveness of the balance between these two factors, a detailed report was prepared during 1959 for the National Advisory Mental Health Council. The committee expressed the opinion that at times it may have held too high standards in evaluating applications from young investigators, but it also felt that to support a young investigator in poor research would be doing him a disservice. Analysis of active small grants indicated that the young investigator is in fact being supported by the program: the largest age category is 30-34. Approximately 50% of the approved applications fall in the pilot and exploratory categories, of which about half are exploratory. The committee expressed the wish that a larger proportion of the applications were of a pilot or exploratory nature, and is considering the possibility that less detailed application forms might encourage more applications of this nature.

In January of 1959 the committee strongly recommended that the \$2,000 ceiling be raised to \$3,500. This recommendation was endorsed by the Council, but administrative action on this recommendation has not yet been taken.

Program Support

During 1959 the study sections and the National Advisory Mental Health Council expressed an interest in encouraging long-term program support for recognized investigators of proven productivity and competence in whom confidence could be placed that they would continue to be productive in the future. As a consequence four seven-year program grants were awarded during 1959 to outstanding scientists in mental health fields. The study sections plan to make additional nominations for program support of this nature. If there is a clear consensus in the recommendations of study section members for support of additional investigators, they will be encouraged to apply for program support.

Long-term, stable support permits the research investigator a much greater freedom for planning and carrying out his research, and facilitates the development, training and maintenance of valuable research teams.

II. THE SUBSTANCE OF THE MENTAL HEALTH RESEARCH GRANTS PROGRAM

The diversity of the mental health research grant program constitutes one of its major strengths. While the past ten years have opened up new channels for the investigation of mental illness, science has only partially begun to comprehend some of the physiological, psychological and sociological factors in the etiology and treatment of mental disorders. Prevention is still a distant goal. The Institute, therefore, has continued to invest in a broad program of basic and applied research in an effort to leave no area unexplored which might contribute to the understanding and amelioration of mental illness.

Within the diversity of fields of research and of research methodologies in the grant program there are still large areas of mutual interest to considerable numbers of investigators. Some of the research carried on in these areas reflects program stimulation by Institute staff. By far the greatest share of the total research program represents the spontaneous interest of scores of highly skilled research scientists, who have been working for many years in their areas of specialization. The following breakdown* of the 822 research grants supported in fiscal year 1959 indicates some of the current areas of research concentration:

<u>Over-All Research Areas</u>	<u>No. of Individual Research Projects in Area</u>	<u>Total Amount Expended by Area</u>
Biochemistry of Mental Illness	65	\$ 952,094
Brain Mechanisms and Behavior	64	1,291,920
Pharmacotherapy in Mental Illness	98	2,242,298
Addiction to Alcohol and Drugs	33	731,900
Diagnosis and Treatment in Mental Illness	129	2,273,679

(continued on next page)

*The selection of these areas for tabulation is arbitrary, of course. Many of the grants fall into more than one research area. Many could be subsumed under other topics as, for example, research in schizophrenia with which 203 of the research grants dealt, for a total of \$6,262,291. The whole program in psychopharmacology is, of course, much larger than the \$2,242,298 for pharmacotherapy in mental illness, totalling in all \$4,077,643 in f.y. 1959.

<u>Over-All Research Areas</u>	<u>No. of Individual Research Projects in Area</u>	<u>Total Amount Expended by Area</u>
(continued from preceding page)		
Basic Thought Processes	62	\$ 499,953
Problems of Aging	20	665,962
Mental Disturbances in Childhood	136	3,248,025
Social Factors in Mental Illness	62	985,178
Improved Care and Rehabilitation of the Mentally Ill	94	2,755,000
Scientific Evaluation Grants	4	60,000
Russian Translation	--	50,000
Total Grant Support F.Y. 1959	822	\$16,928,828

Childhood Disorders

The heavy investment which the Institute has made in research related to mental disturbances of childhood is warranted both by the need and the potential rewards. A painful and costly affliction at any age, mental illness is doubly poignant in childhood.

Mental and emotional disturbances in the child, as in the adult, may take the form of a psychosis, neurosis or psychosomatic disorder, can appear in mental retardation, or may be reflected in delinquent behavior. In a very real sense the gamut of emotional or psychosomatic disturbances in the child may be perceived as failures in the continuing processes of biological and psychological maturation. These individual lags, deviances, or failures may be engendered both by specific vulnerabilities in the individual and by stress situations resulting from the interaction of the individual with his environment.

Childhood schizophrenia is the most common form of childhood psychosis. Formerly viewed as hopeless, in the last decade childhood schizophrenia has entered into a period of therapeutic optimism. In part this recent change of attitude reflects improvements in professional training, an increased social responsibility on the part of the general public, and a gradual improvement in the availability of treatment facilities. The ideal, present-day treatment for the psychotic child namely intensive long-term psychotherapy in a residential treatment center, is, recognizably, still available only for the few.

The growing scientific interest in childhood psychosis has been reflected not only in a new optimism in treatment but in an intensified search for etiological factors in these disorders -- factors which may

lie in a psychotic child's heredity (the specific vulnerability in its constitutional and organic structure and in its biological and biochemical functioning), as well as in the dynamics of family and environmental influences. Scientists today, rather than emphasizing one or the other extreme of the etiological spectrum are more and more acknowledging the interaction of heredity and environment as the key to understanding the failure of maturation which is represented in childhood schizophrenia.

Recent years have also seen a marked swing away from earlier concern with merely establishing and clarifying psychopathological categories to an intensive exploration of the psychodynamic problems and peculiar modes of mental functioning of schizophrenic children.

The therapeutic optimism and experimentation which has characterized reports of studies in childhood schizophrenia in the last decade is still not reflected in recovery rates. But it has been predicted by reliable scientific observers that the research of the next ten years will increase the probability of recovery.

The range of research in the etiology and treatment of childhood psychosis spreads from biochemistry and neurophysiology to anthropology, psychology, and sociology. Research investigators are studying changes in children undergoing psychotherapy, the effects of early and emotionally injurious experience, are carrying out longitudinal research on growth and development processes, and examining factors in perceptual learning in children. Other studies deal with the effect of parent-child relationships on the child's development, with biochemical changes in the blood, and with many other factors which may throw light on early manifestations of childhood psychosis, how it is perpetuated, and the relevance of the pathologic symptomatology to aspects of personality development.

The National Institute of Mental Health, in calling together a national conference on child research in psychopharmacology, has also taken a lead in exploring the values and limitations of the use of psychopharmacological agents in childhood psychoses.

An estimated three out of every hundred children in the United States are mentally retarded. Recent research has indicated the importance of viewing mental retardation as a symptom, not as a diagnostic entity in itself. Mental retardation may be caused by a biological lack or deviation, as in the disease phenylpyruvic oligophrenia, in which research has shown that a modified diet may ameliorate the effects of the underlying metabolic defect. But mental retardation in children may also be due to brain damage or deficit, preventing full functioning. It may also result from emotional disturbances causing blocks in learning or in expression.

The National Institute of Mental Health has actively expanded its support of research and training in this area, including research on the effect of chemotherapy in the mentally retarded, basic research on sociological, psychological and biological problems of behavior and brain function in children, and many other aspects of retardation.

Juvenile delinquency, widespread today in the United States as well as other countries, has been increasing in recent years. Juvenile delinquency is only in part a mental health problem. A considerable number of juvenile delinquents, however, suffer from severe emotional disorder, in which their aggression -- unlike in the schizophrenic child -- turns not inwardly upon themselves, but is released in destructive behavior. Many children who become delinquents "act-out" their emotional problems pathologically, in the belief that they live in a hostile, rejecting world peopled by adults who can be defeated by their behavior.

A number of research investigators have been interested in exploring factors in child rearing as they may be related to the etiology of juvenile delinquency. A Stanford University psychologist carrying out an NIMH grant-supported study found that in families with aggressive delinquent boys a severe break had occurred in the father-son relationship, making identification with the father difficult and resulting in a failure of the child to develop parental values within himself. Another team of NIMH-supported investigators at the Douglas A. Thom Clinic for Children in Boston has been studying processes of interaction in forty families, twenty of which have antisocial children and twenty of which have neurotic children. Their research has pointed up the need for further information on such key factors as the reasons for the failure of adequate socialization of the young child by the time he enters school, the intrapsychic and interpersonal elements which militate against the delinquent child's acquiring more effective controls as his entry into the larger community brings him into increasing strife with peers and elders, and the forces which may be brought to bear to help him curb his antisocial behavior.

In order better to cope with today's problem of juvenile delinquency, more studies are needed on the extent of juvenile delinquency, the effects of preventive procedures, follow-up studies of juvenile delinquents in cities of various size, and studies to help determine the appropriate treatment for juvenile delinquents, so that they can be cared for in a clinically meaningful way when they come into contact with law enforcement authorities.

In 1948 the Institute supported two research studies in juvenile delinquency for a total of \$33,696. Eleven years later, in fiscal year 1959, thirty-nine studies in this area for a total of \$1,116,199 were underway.

Schizophrenia

During fiscal year 1959, as has been noted earlier, NIMH supported 203 research grants, totalling \$6,262,291, which related to schizophrenia. The size of the research program in schizophrenia is indicative not only of the gravity of the condition but the steadily growing interest of research investigators in probing the many unsolved questions concerning the etiology and development of schizophrenia.

No one "cause" of schizophrenia has been identified. Scientists today believe that this condition of profound mental and emotional disorder probably results from the interplay of multiple biological, psychological and social factors -- the specific importance of which may vary from patient to patient. As a consequence, a wide range of research projects in many disciplines, including a variety of collaborative studies, is underway. In view of the importance of the problem and the urgent demands for research results, the Institute has attempted to follow all possible scientific leads in its research program in schizophrenia.

The biology and biochemistry of schizophrenia. A very heavy share of the grant program has been invested in projects exploring the biology and biochemistry of schizophrenia. Research in this broad area, including studies in psychophysiology, endocrinology, neuroanatomy, genetics, biochemistry, pharmacology and electroencephalography, is currently passing through a resurgence of activity as well as undergoing a gradual lessening of its earlier, almost complete isolation from the main stream of modern dynamic psychiatry.

The problem of etiology in schizophrenia is recognizably not a simple one. The human being -- an intricate biological and psychological unit, interacting in societies with other human beings -- is, as one distinguished research investigator described it, the most complex of systems imaginable. In the past, the most productive biological scientists have made most progress by working with simple systems -- single animal cells, bacteria, viruses, and then with part-processes in higher organisms. The testing of hypotheses in biological investigation, when they extend to higher animal systems, requires rigorous methodology and runs the risk of an over-simplified analogy with simpler biological processes. It is these kinds of difficulties that research investigators working in the biology and biochemistry of mental illness are confronted with today.

The increased precision of experiments in some areas of biochemical and biological research carried on under the NIMH research grant program has resulted in a partial disconfirmation of a number of earlier hypotheses concerning biochemical correlates of schizophrenia. Despite this, important contributions dealing with basic physiologic mechanisms related to behavior, with chemical and electrical correlates of brain functioning, and with research on the motivational effects of stimulation of the brain, continue to emerge from grant-supported research.

At the Lafayette Clinic in Detroit, Michigan, investigators supported in part by NIMH have studied the biological and biochemical background of the clinical manifestations of schizophrenia. They have found what appear to be significant correlations between four of the biochemical measures employed and a number of clinical variables, which suggest that a failure of mobilization of biologic energy to meet stress was related to the presence of schizophrenia and the degree of incapacity, rather than to chronicity. A continual overproduction of biologic energy was found in some schizophrenic patients, an overproduction which appeared to be related to clinical chronicity, deterioration and to aggressive destructive outbursts. As with other research on the biochemical and biological correlates of schizophrenia, such results must only be considered suggestive, and must be subject to considerable further testing and amplification before conclusions can be drawn. The Institute plans to continue broad support for research on the underlying physiology of mental illness.

Family processes, psychodynamics, child development. Another significant research avenue to the understanding of mental illness in general, and schizophrenia in particular, leads into an examination of the role of the family as it may affect the development of schizophrenia. A substantial number of grant-supported research projects in this area are under support, and psychological-sociological understandings, particularly with respect to family interactions, are contributing steadily to our knowledge of schizophrenic reactions.

Several long-range, grant-supported studies on the intrafamilial environment of the schizophrenic patient have helped to clarify such factors as the transmission of irrationality and distortions of reasoning which may occur in the family of a schizophrenic patient, and the abnormal interaction and organization which often exist.

Some common features shared by those families which have been studied include an atmosphere of emotional struggle and a pronounced tendency to surround the growing child with more or less unreal conceptions of, and

approaches to, life. It is still not clear whether this background may be assumed to be a directly attributable cause of mental illness.

Treatment methods in schizophrenia. A variety of physical, psychological and psychopharmacological methods are employed today in the treatment of schizophrenia. None has offered any promise of all-time success; all still require extensive research investigation. There seems to be little doubt, today, that a number of the new psychopharmacologic drugs do relieve the symptoms of the agitated, hyperactive schizophrenic patient. As is discussed later, chlorpromazine and reserpine, on which most of the research has been done, have proven to be particularly effective and a number of promising newer drugs have appeared. While many schizophrenic patients did not respond successfully in the past to the use of psychotherapeutic treatment, therapists over the years, and particularly in the United States, have continued to explore the effectiveness of psychotherapy with both acute and chronic patients. Recent research suggests that intensive psychotherapy may not only prove very helpful to schizophrenic patients but may also throw light on the etiology of the schizophrenic process. Many of the studies in psychotherapy, supported through the NIMH research grant program, are related to schizophrenia -- research analyzing the therapeutic intervention process, research examining the role of the individual therapist's personality in treatment, studies on the long-term effects of therapy, and many other avenues of research in this field.

A number of somatic or physical treatment methods are still used with schizophrenic patients, including electroconvulsive shock, insulin shock therapy, psychosurgery, and pharmacotherapy, with varying responses in improvement.

The use of shock therapy in schizophrenia has resulted in what has been described as quantitative rather than qualitative effects, characterized by partial improvement, relatively little change in the patient's prepsychotic personality pattern, and frequent relapses. While the use of psychopharmacologic agents, combined with psychotherapy when possible, has replaced shock treatment in a number of hospitals, research studies are still examining the impact and effectiveness of these alternative treatment methods. NIMH investigators have confirmed the belief that behavior change in electroshock depends upon an actual alteration in brain function, as evidenced by serial changes in the electroencephalogram.

Improvement of Mental Hospital Care and Facilities

For the psychotic patient the adequacy of mental hospital treatment facilities may be of crucial importance in his eventual recovery. Improvement of the care and treatment facilities in mental hospitals has been a

primary goal of the Institute's program over the years. While persons experienced in mental hospital work have long been aware of the influence of the physical and social environment, staff morale, and therapeutic atmosphere upon the patients' behavior, it is only quite recently that systematic study of the social environment of the mental hospital has been undertaken in joint research efforts of social scientists and psychiatrists. Reports from NIMH grant-supported research at the Massachusetts Mental Health Center in Boston emphasized this year that at this hospital it was almost entirely social changes that were effective in reducing radically disturbed behavior and consequently the use of continuous baths, chemical restraints, forced feedings, sheet packs and seclusion. It is at once surprising and yet a familiar phenomenon in history that old truths must continually be rediscovered by succeeding generations. Such findings on the importance of the milieu of mental hospitals which twentieth century research, with its careful testing and controls, has produced, were suggested by Soranus in the second century, by Vives in the fifteenth century, by de Sauvages, Pinel, Tuke and others in the eighteenth century. It is only by re-examination of medical practice in the light of the new knowledge of each age that medicine advances. One of the significant conclusions of the Massachusetts Mental Health Center research, as well as that of other modern investigators, is that any research to evaluate therapy must consider sociopsychologic factors of the hospital setting, and that greater attention, therefore, must be paid to specifying environmental variables which mediate response to specific therapeutic procedures.

A wide range of studies is also being supported on effectiveness of clinic treatment, the reasons for "drop-out" from outpatient psychiatric treatment, short-term therapy in day-care facilities, and factors in the social integration of patients released from mental hospitals. Still a further grant-supported research project has been examining distinctive features of the practice of medicine and surgery in psychiatric hospitals, with special reference to the types of treatment, role of the surgeon or physician, and other factors. Results of this study may prove useful to physicians and surgeons caring for psychotic patients in general hospitals.

Other Areas of Research

Studies which deal directly with the nature and treatment of mental disease are often more dramatic to describe, and more interesting in their possibility of immediate application. Together with the great volume of research on mental disorders and treatment, NIMH over the years has also supported a steadily growing body of research in other important areas -- research in such psychological processes as motivation, intelligence, learning, perception, attitudes. Research on the epidemiology of mental

illness is also adding to our knowledge of community patterns of mental illness and health. And studies in industrial mental health, school mental health, communication processes, and research such as the project which resulted this year in the publication by the University of Michigan's Institute for Social Research of a series of articles entitled Studies in Social Power -- are all helping to widen our framework of knowledge of man in his environment.

III. THE PSYCHOPHARMACOLOGY RESEARCH PROGRAM

During the past year the psychopharmacology program has advanced in four respects. First, preliminary results are beginning to emerge from a number of studies which began during the first two years of the program. Second, new studies which have been initiated during the past year give the program even better coverage of the area of clinical drug evaluation than has been the case in the preceding years. Third, increased staff size and adequate time for careful planning has provided a sound foundation for the development of special programs in such areas as preclinical drug screening, synthesis of special chemical compounds, the use of psychoactive drugs in the general practice of medicine, and data analysis. Fourth, the Psychopharmacology Service Center's Technical Information Unit through the Psychopharmacology Service Center Bulletin and other scientific informational services has become increasingly useful to research workers interested in psychopharmacology.

A. Psychopharmacology Service Center Program -- Administration and Staff Activities.

The staff of the Psychopharmacology Service Center was augmented during the past year by the addition of a pharmacologist, a psychologist, a psychiatrist, a chemist, and a physician. These new professional staff members are enabling the Center to expand its program planning and its informational and consultative activities. The Center's most urgent need at this time is for an experimental psychologist skilled in the area of animal behavior to work with the Center's pharmacologists in the development of a special program in the field of preclinical drug screening. An attempt is also being made to recruit an Assistant Chief to assist with the increasing programmatic and administrative load which has come with the expansion of the psychopharmacology program.

The rapidly increasing demands placed upon the Center for help in the analysis of data from psychopharmacological studies and for the utilization of high speed computer techniques in the refinement of methods useful in psychopharmacologic research have been only partially met by the efforts

of the Center's professional and clerical staff working in collaboration with the Statistical Processing Section of the Division of Research Services. The improvements in the scoring of the Clyde Mood Scale and the other interesting results which have emerged from this activity during the past year are most encouraging. Negotiations for the support of an expanded program of this sort under contract are in their final stages.

Informational Activities in Psychopharmacology. The activities of the Technical Information Unit expanded considerably during 1959. This Unit is responsible for implementing the Center's role in improving communication in the field of psychopharmacology.

There are now 7,814 reprints, manuscripts, and books in the document file. These are used to answer inquiries of all kinds about psychopharmacology, prepare bibliographies, and serve as a basis for reviews and analyses of the field. All material is now indexed and coded for rapid searching. An average of five inquiries a day are now handled -- not including inquiries from the Psychopharmacology Service Center staff -- ranging from relatively simple requests to extensive and complex bibliographic searches. Most of the materials have also been abstracted or annotated. However, it has recently been decided that in terms of time and effort the abstracts are not of maximal usefulness and therefore will no longer be written except in special circumstances.

The Psychopharmacology Service Center Bulletin was started in 1959, and five numbers have now been published. This is a small "newsletter" type of publication, issued at irregular intervals, emphasizing prompt informal exchange of information that might be useful to investigators in the field of psychopharmacology. Issuance of this Bulletin (formerly called Reports) has been received very enthusiastically by scientists. The Unit hopes to be able to expand it so as to be more useful, but many problems of clearance and production will have to be solved before this can be done.

Two grants relevant to the work of the Unit were awarded in 1959. One is for the translation of articles in this field; the other is for a survey and analysis of publication activities and needs of scientists who are doing research in psychopharmacology.

Activities of the Advisory Committee on Psychopharmacology and Changes in Committee Structure. The seven member Advisory Committee on Psychopharmacology continues to provide the Center with advice and guidance in the areas of program planning and policy development. As the Committee has come to grips with more detailed technical problems in special subareas

of psychopharmacology, it has increasingly felt the need to delegate some of the specifics of planning to groups of specialists in particular problem areas. At its October meeting the Advisory Committee on Psychopharmacology specifically recommended the creation of two permanent subcommittees, one in the area of clinical drug evaluation and one in the area of preclinical drug screening.

The second subcommittee grew directly out of a series of three special meetings on special aspects of preclinical drug screening (operant conditioning methods, other animal behavioral approaches, and neuro-pharmacological approaches) held by the Center during the past winter and spring. These preliminary exploratory meetings were followed by the meeting of a specially selected Ad Hoc Committee on Preclinical Drug Screening which was held last summer. This group was composed of representatives from the participants in the three earlier meetings and appropriate members of the Advisory Committee on Psychopharmacology; it strongly recommended that the contract mechanism be used to support the parametric study of the sensitivity of appropriate drug screening procedures to various dosages of a spectrum of seven known psychoactive drugs. A variety of potentially useful screening procedures which might deserve such detailed study were suggested.

The Advisory Committee on Psychopharmacology at its October meeting felt the complexity of this field was such as to warrant the continuing attention of a permanent subcommittee and recommended that such a subcommittee be established. In the interim, it felt that a pilot contract, which would work out the relationships between blood and brain levels of the seven standard drugs and a relatively simple behavioral measure such as motor activity, should be developed. It is probable that such a contract will be activated in the early spring of 1960.

The Advisory Committee on Psychopharmacology also felt that the continuing problems attached to the early clinical assessment of new psychiatric drugs and the systematic controlled evaluation of the more promising of these new drugs also warranted the attention of a permanent subcommittee on clinical drug evaluation.

At its March meeting the Advisory Committee had recommended that the contract mechanism be used to support the synthesis of chemical substances needed by investigators doing basic research in psychopharmacology. One such contract for the synthesis of serotonin analogues (indole amines and congeners) was awarded in the early fall, and a second contract for the synthesis of tritium-labelled tryptophane is under negotiation. At its October meeting the Committee approved a formal public announcement of this

special program and recommended that the contract mechanism only be used for the synthesis of compounds not readily available through the usual commercial channels and of interest to several investigators conducting psychopharmacologic studies. The synthesis of a compound of interest to only a single investigator should be processed through regular research grant channels. A Psychopharmacology Chemistry Synthesis Panel is being formed to provide the Center with program guidance in this special field and to review requests for the synthesis of chemicals fitting the general conditions outlined above.

The Psychopharmacology Review Committee which was formed last year to relieve the Advisory Committee on Psychopharmacology of the increasing burdensome grant-application review process was transferred to the Division of Research Grants in July of this year and is now the Psychopharmacology Study Section.

Conferences and Meetings. The series of meetings on various aspects of preclinical drug screening have been discussed above. The proceedings of the conference on child research in psychopharmacology held last fall were published in August by Charles C. Thomas under the title, Child Research in Psychopharmacology, Seymour Fisher, editor.

A small informal meeting on the metabolism of the phenothiazines was held in Bethesda in October of this year and was attended by scientists from four laboratories working actively on this problem. At this meeting it was reported that the metabolites of chlorpromazine continue to be excreted by psychiatric patients for several weeks after medication is stopped. It was suggested that the eventual exacerbations of symptoms occurring in such patients might be temporally directly related to the lowering of excreted metabolites of chlorpromazine below a critical level. It was also evident that the rapid disappearance of administered chlorpromazine from the blood stream into the tissues made the use of free chlorpromazine blood-level determinations of little value in monitoring the clinical administration of the drug. The many questions raised about the chemical identity of the many phenothiazine metabolites found in the urine of treated patients suggested that the synthesis of small amounts of the suspected metabolites would be of great service to investigators. The availability of known chemical compounds for reference purposes would enable investigators to prove the exact structure of the urinary metabolites they have isolated, some of which might possibly be responsible for some of the apparent pharmacological effects of the parent drug. These compounds may be provided through contract under the chemical synthesis program.

Interaction with Drug Companies. Scientists from a number of pharmaceutical laboratories participated in the series of meetings on problems of preclinical drug screening held by the Center, and the Center's staff has discussed problems of drug development and clinical drug screening with representatives of a number of drug firms. Staff members have also attended a number of special meetings held by drug companies to review research findings on compounds under extensive clinical investigation. The Center has carried out some preliminary analyses of some excellent data on the sensitivity of a detailed animal behavioral rating scale to standard drugs collected by an investigator working in a pharmaceutical laboratory. These data are too voluminous and complex to be analyzed by the investigator's company, but the establishment by the Center of a data analysis unit would make possible the more extensive analysis of this and other similar collections of good but unanalyzed data on the sensitivity of special screening procedures to known drugs, and could lead to the publication of the findings and the development of improved screening procedures whose properties could be more extensively studied by the Center in contract-supported laboratories. The drug industry has also been most helpful in providing the Center with pharmacological and clinical data on new drugs still in the early stages of clinical testing.

B. Research in Psychopharmacology

Currently supported research in psychopharmacology now covers a broad range of clinical and basic studies covering many important aspects of the total field.

Clinical Studies. Some of the most definitive findings during the past year have come from outpatient studies of the effectiveness of drugs in treating relatively chronic schizophrenic patients in the community. Work in the Aftercare Clinic of the Springfield (Maryland) State Hospital has conclusively shown that drugs play a very important part in preventing relapse in schizophrenics released to the community after two or more years of hospitalization. In a double-blind study, 73% of the patients transferred from drug to inert placebo relapsed while only 9% of a control group maintained on their original drug dosage relapsed. A second study underway in the Research Unit of the Manhattan Aftercare Clinic of the New York Department of Mental Hygiene is comparing the short and the long-range effectiveness of two different methods for treating ex-mental hospital patients being followed in the community who relapse. Half of the patients under the care of this Unit who relapse are returned to the state hospital where they were originally treated. The other half are treated in a special day-care center with intensive pharmacotherapy. It is too early to say whether these two groups will differ in their symptoms or social adjustment at the end of the planned two-year follow-up period, but none of the first twelve relapsing patients,

who were treated in the day-care center with drugs, have had to be hospitalized and all were back in the community, no longer requiring day care, within six weeks of the time of relapse, while all members of the control group were still in the hospital to which they had been returned. A third study carried out at the Psychopharmacological Research Unit of the Downtown Medical Center in Brooklyn, New York, has been comparing the effectiveness of chlorpromazine, promazine, and placebo in treating relatively chronic schizophrenic patients who have been ill for more than a year but are still in the community. Approximately 55 patients have received each treatment. Of the placebo treated patients 28.6% have required hospitalization while 18.2% of the promazine treated patients have required hospitalization. Only 4.8% of the chlorpromazine treated patients have required hospitalization. The superiority of chlorpromazine over placebo in the study is both striking and statistically significant.

Interesting work is also underway in the area of drug treatment of neurotic outpatients. One grantee at the University of Pennsylvania has reported an excellently designed study of the comparative values of meprobamate, prochlorperazine, amytal, and placebo in the treatment of patients coming in to a medical outpatient department with neurotic complaints. In this study all patients received all four treatments, each for two weeks. The study was double-blind. Meprobamate showed itself to be, on almost all measures, the most effective of the four treatments in relieving symptoms and was also the treatment preferred by most of the patients. It was particularly effective in relieving mild depression and irritability in this group of patients. Prochlorperazine, on the other hand, was particularly effective in the smaller subgroup of patients who had prominent gastrointestinal complaints and was the most effective drug for patients of this type.

A similar study now underway at the University of California in Los Angeles should provide comparable data on a similar outpatient group and will, in addition, compare the effectiveness of regular psychotherapy without medication with the effectiveness of the various medications. Patients receiving drugs in this study will only be seen for 15 minutes once every two weeks, while patients receiving psychotherapy will be seen for an hour weekly. A third group at the Lafayette Clinic in Detroit has been studying a variety of drugs in outpatients in a preliminary manner, including Deaner for the treatment of outpatient depressions and trimeglamide in outpatients with anxiety. Both these drugs were found to be relatively ineffective even in uncontrolled studies and reports on the treatment results obtained with them have been published. Preliminary trials carried out by this group on captodiamine have been more promising, and the group is now engaged in a much more

detailed controlled study of the effectiveness of this compound in neurotic outpatients. This group has been systematically screening newer agents reported to be effective in the treatment of outpatients and has the reasonable philosophy that drugs that show no striking effects on uncontrolled studies are not worthy of more detailed, lengthy, and expensive controlled clinical trials. The investigators also deserve credit for reporting their negative findings in the literature. Negative results of this sort are only too often left unpublished.

Controlled studies of drug effectiveness in hospitalized schizophrenic patients are also being actively carried out. Preliminary results from a study at Spring Grove State Hospital which compared chlorpromazine, prochlorperazine, perphenazine, triflupromazine, mepazine, phenobarbital, and placebo are available. Analysis of the findings on half the patients in the study already show significant differences in effectiveness between the treatments used. In these newly admitted psychotic patients perphenazine appears to be the most effective drug in clinical ratings made at the end of the first two weeks of treatment but its superiority over triflupromazine, chlorpromazine, prochlorperazine, and promazine cannot be conclusively demonstrated in a sample of this size. On the other hand, mepazine appears to be no more effective than placebo in the treatment of patients of this sort and phenobarbital causes a significant increase in the undesirable aggressive behavior of patients receiving it. An interesting by-product of this study is the finding that the attitudes to drugs of the several treating physicians, whether strongly positive or strongly negative, do not influence either the amount of medication which they prescribe or the effectiveness of this medication in the patients receiving it. These findings are in direct disagreement with an earlier study by a group in Kansas which suggested that patients treated by doctors enthusiastic about drugs showed much greater improvement than patients treated by doctors who were critical or antagonistic to drug treatment. A comparative study of the effectiveness of chlorpromazine, perphenazine, triflupromazine, and prochlorperazine in chronic schizophrenics hospitalized for more than two years at Napa State Hospital is almost completed and results should be available in the next few months. A similar study carried out by the Veterans Administration in a number of their hospitals on the same drugs which were studied at Spring Grove has been completed and shows findings quite similar to those emerging from the grant-supported study.

Two controlled comparative studies of the effectiveness of the new antidepressive drugs are now underway. One, involving cooperation between several of the New Jersey state hospitals and Rutgers University has been comparing iproniazid with electric shock and placebo in the treatment of newly admitted depressed patients. Data on the first 100 patients in this

study are now being analyzed and results should be available in early January. In the second phase of this study it is planned to also study imipramine, another promising new antidepressive drug, which is pharmacologically unrelated to iproniazid. A second study involving three Massachusetts state hospitals which are cooperating with the Massachusetts Mental Health Center in Boston will be comparing electric shock, imipramine and one of the new monoamine oxidase inhibitors, probably isocarboxazid, in a similar group of newly admitted depressed patients. Two other studies, one at the Worcester Foundation in Massachusetts and another at the Downtown Medical Center in Brooklyn, New York, will be studying the interactions between the clinical effects of antidepressive monoamine oxidase inhibitors and the effects of these drugs on enzyme systems in the patients treated, attempting for the first time to determine whether clinical change and biochemical change are as directly interrelated, as has been hypothesized. Another study will be comparing the effects of imipramine with those of placebo in the Philadelphia Psychiatric Hospital and will also be studying a variety of neurophysiological and psychological measures which may be sensitive of prognostication of drug response.

In addition, during the past year, there has been a satisfying increase in the number of grant supported studies of the effectiveness of new drugs undergoing very early clinical trial in psychiatric patients. Work of this sort is underway at the Delaware State Hospital, the New York State Psychiatric Institute, the Stanford Medical School, the Norristown State Hospital in Pennsylvania, the Springfield State Hospital in Maryland, and the Nebraska Psychiatric Institute.

Preclinical Drug Screening. The detailed study of the effects of known drugs on mood, psychological functioning, and on physiological variables in normal subjects gives increasing promise of providing clear and detailed information about the special properties of individual drugs with clear relevance for their clinical use. For example, a small study of the effects of single small doses of meprobamate and dextroamphetamine in non-psychiatric elderly patients in a domiciliary showed that both drugs significantly impaired the subjects' clarity of thought as evidenced by a decrease in their scores on the "clear-thinking" factor of the Clyde Mood Scale. Work on the effects of a barbiturate, phenyltoloxamine, reserpine, and meprobamate on normal subjects at the Massachusetts Mental Health Center has been effective in clearly eliciting the differences between these drugs as well as their similarities and has permitted the development of a clear operational definition of the widely and loosely used term, "tranquilization." In addition, comparison of the effects of several dosage levels of these drugs clearly shows that one possible reason for meprobamate's clinical popularity may lie in the wide dose range over which tranquilization or

desirable sedation is elicited while undesirable hypnotic effects with concomitant drowsiness and impairment of psychomotor performance do not appear. Although phenyltoloxamine has some similarities to meprobamate at a low dose, it produces undesirable hypnotic effects when the dose is raised. This group is now studying several phenothiazine derivatives using the same approach.

Most of the work now underway relevant to drug screening at the animal level has not advanced far enough to permit definite conclusions to be drawn, although interesting and promising new techniques continue to be developed. For example, a group at Yale has developed a method which provides simultaneous measures of the strengths of both approach and avoidance drives and makes it possible to determine whether a drug affects either or both of these drives.

Work at the University of Maryland has also yielded interesting data on the properties of a multiple-schedule operant situation and its sensitivity to a single drug, scopolamine. This type of schedule permits the study of the effects of a drug on a variety of behaviors and also provides information on the behavior of the animal during neutral periods between the reward or punishment periods during which lever pressing has no effect whatever. In the non-drug state, the animal is inactive during these neutral periods but under drugs interesting carry-overs of lever-pressing behaviors are observed.

Work at this laboratory also is useful in warning against the over-generalization from behavioral effects of a drug obtained in only a single animal species. Scopolamine affects the rat and the pigeon quite differently even though identical operant schedules are used; and chlorpromazine, which facilitates in the rat the extinction of a conditioned emotional response to a warning sound previously always followed by painful shock, does not facilitate the extinction of the identical conditioned emotional response in the mouse.

The fragmentary nature of these and other similar studies now underway under grant support or independently is evident, and underlines the need for the more extensive and systematic parametric studies of known drugs at several dosage levels in several species of the type described above under staff activities.

C. Basic Research on Mechanisms of Drug Action

Work in this area also suffers from its diversity and the fragmentary nature of the results now available. The next few years should permit the

increasing integration of the findings coming from the broad spectrum of basic studies now under support. For example, work on the metabolism of phenothiazines in patients is being complemented by basic studies of certain "free radicals," compounds of special interest to the physical chemist, which occur as intermediary metabolites of chlorpromazine. Other studies deal with the effects of chlorpromazine on mitochondrial enzymes and on the differential distribution of radioactive chlorpromazine in stimulated and depressed brain areas.

Another grantee at Purdue has shown that radioactively tagged meprobamate is not metabolized or altered in structure within the brain. This is of importance, since early studies of meprobamate had suggested that the time lag between the administration of meprobamate and the development of its clinical effects might be due to the changing of meprobamate within the body to a second and chemically different compound which could be causing the pharmacological effects usually attributed to meprobamate itself. The work mentioned above weighs strongly against this theory.

Work now underway at the University of Washington is focused on the differential effects of monoamine oxidase (MAO) inhibitors on liver and brain monoamine oxidase, and preliminary reports indicate that one of the newer monoamine oxidase inhibitors, phenylisopropylhydrazine, may have advantages over iproniazid. Iproniazid inhibits liver MAO rapidly and brain MAO slowly while phenylisopropylhydrazine appears to have a selective affinity for brain MAO.

Another grant-supported study on psychotoxic substances in schizophrenic plasma at the Worcester Foundation for Experimental Biology has added a fascinating new facet to the controversial taraxein theory of schizophrenia. In this study the deleterious effect of a specific sub-fraction of schizophrenic serum on rope climbing in the rat has been confirmed and the earlier work by Winter and Flataker at Merck has been replicated. In addition, the group at Worcester has found that a dializable substance in this schizophrenic serum fraction will cross a membrane and will render psychotoxic a previously non-psychotoxic similar fraction derived from normal human serum.

Other interesting work on such topics as the effects of drugs on various brain systems and on the neurophysiological correlates of conditioning is now under way, but the complicated nature of such work and the laboriousness of the hand analysis of neurophysiological data has made progress slow. The increasing work on the application of high-speed computer

techniques to the analysis of data of this sort may well increase several-fold the productivity of workers in this area during the next few years.

D. Psychopharmacology Service Center Plans for the Coming Year.

A number of the program plans in psychopharmacology have been outlined above in the section describing current staff activities. These include the contract support of parametric studies of animal drug screening methods and the expansion of facilities for consultation with clinical investigators, the analysis of their data and the development of improved clinical measuring devices. The program for the support through the contract mechanism of the chemical synthesis of new compounds needed by basic researchers has also been described. These will constitute major areas of effort and interest during the coming year.

In addition, special efforts will be made to stimulate badly needed research on the effects of drugs in elderly psychiatric patients, an area now badly neglected. The available clinical literature in this area has been reviewed and contacts with a number of workers in the field of aging have been made. Some preliminary work with investigators possessing both research interest and potential in this area has been initiated and this work will be expanded during the coming year.

Staff work has also begun in the area of psychiatric drug use in general medical practice. The Advisory Committee on Psychopharmacology has encouraged the staff to examine in detail data being obtained by two national organizations which collect detailed information on drug use by a panel of physicians throughout the country. In addition, the potential usefulness of drug-use data from special medical-care programs like New York's Health Insurance Plan and the Group Health Association in Washington, D.C., is being explored.

Preliminary work on the possible relation between drug usage and motor vehicle accident rates has been approved by the Advisory Committee. Plans are being formulated to investigate this area by appropriate experimental and statistical approaches.

The Psychopharmacology Service Center's staff and the Advisory Committee on Psychopharmacology continue to be very interested in the promotion of research training in psychopharmacology and related areas and will continue to work closely with the staff of the Training Branch of the National Institute of Mental Health in helping to develop good research training programs in this area.

IV. THE MENTAL HEALTH CAREER INVESTIGATOR GRANT PROGRAM

Mental health career investigator grants are provided by the National Institute of Mental Health to assist in the preparation for research careers of qualified young psychiatrists and scientists in allied disciplines. This program enables highly qualified young men and women to spend from three to five years in full-time research and the further development of research skills and knowledge.

The career investigator is encouraged to carry out a combined program of research and training for research on any phase of the problem of mental illness. The research may deal with clinical or non-clinical problems, including any aspect of etiology, diagnosis, treatment, or prevention of mental illness, as well as related problems in the basic scientific disciplines. The stipend of the career investigator is scaled flexibly according to need and the stage of training he has reached. In addition, funds are provided for the costs of research training and the costs of the career investigator's research program.

The selection of psychiatrists as career investigators is emphasized because of the shortage of adequately trained research personnel in clinical psychiatry. The "CIG" program also considers proposals for the appointment to departments of psychiatry of outstanding young research men who can bring knowledge to psychiatry from other fields of medicine or from the biological and behavioral sciences. When appropriate, furthermore, applicants from departments other than psychiatry, interested in psychiatric research, are considered.

In this new type of research training support, which combines features of both the research grant and the research fellowship program, the Institute has attempted to establish a model for a research career in psychiatry. During its brief history the program has shown that outstanding young psychiatrists will accept the opportunity to enter careers of leadership in psychiatric research, and that other young scientists, equally well qualified for fields of investigation essential to psychiatry, are attracted to psychiatric research careers. The vitality of the program and the deeply sustained interest of the career investigators in their research is clearly evidenced by the fact that, even in the rapidly shifting psychiatric world with its manifold job opportunities, all of these investigators except one, who is now in private practice, have continued in research as a major activity.

Since the start of this program in 1954, 21 career investigators have been appointed on a highly selective basis, two to five awards being made

per year. These individuals have been chosen from among a total of 64 applicants who already had passed through a highly selective screening process at their own universities. The average yearly grant has risen from \$13,230 in 1954 to \$18,835 in 1959, an increase which reflects the general rise in living and research costs, and the average yearly stipend has increased correspondingly from \$8,666 to \$10,703. A total of \$1,263,540 has been spent on this program to date.

Of the 21 career investigators appointed to date, 16 are psychiatrists, three are psychologists, one is an internist, and one is a biochemist with medical training. All 21 have been sponsored by departments in university settings or in hospitals affiliated with universities. The fields of research in which the career investigators are working include psychosomatic diseases and emotional disturbances, psychopharmacology, child development, the biochemistry of the brain, mental responses to environmental stimuli, and social factors in the treatment programs of psychiatric hospitals.

Eight applications were submitted for consideration in November 1959. These include two applications for the extension of three-year grants to five-year grants, and one reapplication from a psychiatrist who was prevented from accepting a grant awarded to him in 1958 by induction into military service. The five new applications have come from three university departments which have previously sponsored applicants, from a psychiatric center not affiliated with a university, and from a state hospital.

Four psychiatrists whose career investigator grants have terminated are now holding positions in research centers. One has a combined clinical and research position at the Children's Medical Center in Boston, a second is Director of Research in the Department of Psychiatry at Boston University, a third is Chief of Research at the Langley Porter Clinic, and a fourth has a similar appointment at the state hospital affiliated with the Department of Psychiatry and Neurology at UCLA. Two of the three investigators whose grants will terminate in June 1960 have been invited to remain as research professors in their sponsoring departments, the Massachusetts Mental Health Center and the Department of Psychiatry at Western Research University.

Rapid expansion of the career investigator program is out of the question because of the objective of leadership in psychiatric research, and because the number of research centers which are prepared to sponsor and train career investigators is very limited. Departments with established research programs in psychiatry are increasing their resources, however, and are planning to make applications, or additional applications. Psychiatrists will doubtless continue to be awarded the majority of career investigator grants, but applications from outstanding young scientists in the

biological, psychological or social sciences will be encouraged whenever qualified departments sponsor them and offer training which will bring them into careers of psychiatric research.

V. THE RESEARCH FELLOWSHIP PROGRAM

Recognizing that continued strong support of research training is warranted because of a general shortage of research scientists in the disciplines relevant to mental health, the Congress increased the appropriation to the National Institute of Mental Health for fellowship awards in fiscal year 1960 by more than 70%. For f.y. 1959 the appropriation was \$1,145,000. For f.y. 1960, the appropriation is \$1,996,000. Allowing for the increase in the average expenditure for a research fellowship resulting from a new scale of stipends and allowances effective in January 1959, the current funds will provide for approximately 470 fellowship awards, an increase in number of 62% from the 289 fellowships awarded in f.y. 1959.

The primary purpose of the research fellowship program is to increase the number of scientists qualified to conduct independent research by providing opportunities for research training in any field of science which bears upon the problems of mental health and illness.

Support is awarded for the research training of individuals who show promise in research and whose primary interest is in entering a career of mental health research. It is the responsibility of the research fellowship program to anticipate the needs for scientists to staff the research centers of the United States and to carry on the national program of research on the problems of mental illness and mental health. As this program expands, it must engage a larger number of scientists, trained in all the many disciplines of biology, medicine, psychology, and the social sciences which are required for mental health research. In meeting this need, it is necessary to maintain high standards of selection, to offer support wherever sound research training may be obtained, to encourage research training in fields handicapped by shortages of trained scientists, and to anticipate the demand from the growing number of graduate students in both the well established and the currently developing centers for research training.

The number of persons engaged in training for research in mental health is rapidly increasing. In f.y. 1959, NIMH received a total of 442 applications for research fellowships, whereas there were 264 applications in f.y. 1958; during the first quarter of f.y. 1960 the number of applications was 160, an increase from the first quarter of f.y. 1959 of 100%.

In f.y. 1959, the 289 awards were divided as follows: predoctoral 197 (68.2%); postdoctoral 79 (27.3%); and special 13 (4.5%). During the current fiscal year (1960), 35% of the available funds have been allocated to the first two quarters. It is estimated that, during the first half of the year, 208 awards will be approved, divided approximately among 154 predoctoral, 42 postdoctoral, and 12 special fellowships.

The Institute has continued to encourage research training at all levels. With the expansion of graduate programs in psychology, increased attention to behavioral research in the biological fields, and the development of research training in the graduate departments of the social sciences, a consistent increase in the number of predoctoral applications is to be expected.

Postdoctoral training is required especially in research fields which encompass more than one discipline, characteristically (among applicants for NIMH fellowships), by those preparing for research on the physiological bases or correlates of behavior. In f.y. 1959, 24% of the total appropriation of \$1,145,000, or \$275,000, was earmarked for fellowships in the physiological sciences. The Institute has intensified its effort to bring the fellowship program to the attention of well-qualified candidates in departments of physiology, biochemistry, pharmacology, neurology, and other biological sciences. Increasing numbers of psychologists, interested in acquiring further physiological training for use in both human and animal experimentation, are applying to the research fellowship program. Actually, a total of \$475,000 was awarded in f.y. 1959 for physiological fellowships, and approximately 63% of this expenditure, or \$300,000, was used for postdoctoral awards.

The special fellowship is particularly valuable in helping established research investigators in one field acquire the skills and methodologies of disciplines ancillary to their research, in order to fit them better for the multidisciplinary approach so important today in mental health research. Staff discussions with faculty members in university departments of psychiatry, psychology, physiology, sociology, and other disciplines concerned with mental health research have revealed a much greater need for special research fellowships than could be judged by the number of these fellowship applications to date. Many faculty members have wished to obtain additional research training, but have been unaware that the special fellowship might provide them with this opportunity. Special fellowship awards increased from six in f.y. 1958 to 13 in f.y. 1959; and since July 1, 1959, 12 special awards have already been approved.

A new type of research training support for anthropologists became available in f.y. 1959 following a recommendation of the National Advisory Mental Health Council. Under this new policy, mental health research

fellowship funds are available for the research training of anthropologists who require field-work experience. The funds for this purpose are now provided for both predoctoral and postdoctoral fellows through the medium of supplementary research grants. In f.y. 1959, 14 anthropologists were awarded fellowships, and since July 1, 1959, ten additional awards in anthropology have been granted. Comparable developments in the research training of sociologists and social workers are represented by 11 awards in sociology and six in social work since July 1, 1959.

Continued expansion of the whole mental health research fellowship program is planned. Fellows will continue to be trained for investigation in a wide variety of important problem areas including aging, environmental stress, mental retardation, psychopharmacology, neurophysiology, and psychiatric treatment. Emphasis will be given both to the training of the predoctoral student and to advanced training to meet the specialized needs of the mature scientist. The basic philosophy of the Institute will be maintained: to train scientists in all the disciplines having relevance to mental health and to encourage them to focus their specialized knowledge and interests on the problems of mental health and illness.

TRAINING BRANCH

Annual Report for Calendar Year 1959

The year 1959 was notable because of both a marked increase in training funds and a series of important administrative changes in program operation which made it necessary to use a major share of this increase for other than program expansion. This increase in budgetary support was fully justified by the intended expansion of the program and all the funds available could have been expended for support of meritorious awards. At the same time, the utilization of some funds to implement certain administrative changes, as described below, was an urgent necessity.

Program Operation and Development

The most acute problem in the fight against mental illness continues to be a shortage of well-trained personnel. This manpower shortage has been comprehensively documented in a recent publication by Dr. George Albee, "Manpower Trends in the Mental Health Professions," published under the auspices of the Joint Commission on Mental Illness and Health.

In brief, Albee's data show that shortages in all four mental health professions, psychiatry, psychology, nursing and social work, will intensify in the next fifteen years. Unless there is a serious error in the estimates of population growth for the future - which seems most unlikely - or unless there is a major break-through in mental health research which changes the entire treatment process, or unless there is drastic improvement in educational facilities at all levels, we will be faced with an even greater manpower crisis in mental health professions in the immediate and foreseeable future than exists today.

From its very inception, the training program of the National Institute of Mental Health has been a vital effort to alleviate this shortage of professional personnel. The primary effort of this training program has been to increase as rapidly as possible the number of qualified mental health personnel in all areas of professional activity, including clinical services, teaching, research, consultation, and administrative positions. To accomplish this aim, grants are awarded to medical schools, universities, schools of social work, schools of nursing, schools of public health, hospitals, clinics, and various national and local professional societies.

In response to expanded needs, the areas of support have been extended to include support for the following training programs: To increase and improve the mental health content in the curricula of medical schools and collegiate schools of nursing; to stimulate and accelerate the establishment of specific research training programs designed to produce additional research specialists in the mental health disciplines

and in the biological and social science disciplines which have relevance to mental health problems; to support through pilot projects and special grants, the exploration of better teaching methods and the development of training programs in such areas as juvenile delinquency, alcoholism, mental retardation, and geriatrics; and to stimulate the expansion of psychiatric training for general practitioners.

I. Program Administration

In the annual report for 1958, it had been pointed out that the program expansion for that year would result in extensive change in program administration. Some of that change occurred last year and was described in the annual report for 1958. Further developments in program administration this year fall into the following major categories:

A. Adjustment of Beginning Dates of Grant Awards

It had become apparent over the past few years that the existing time-schedule for awarding of mental health training grants was increasingly disadvantageous for grantees. The effect had been such that grantees whose applications had been approved did not have adequate advance notice for the most effective utilization of grant funds. The problem was sufficiently critical at this time to necessitate a change in administrative procedure, even though, as will be shown, such a change will temporarily delay the support of some new training grants.

Under the existing administrative procedure, applications for all but a few exceptional grants were filed by December 15th each year, for review and approval the subsequent spring. All grants for graduate training in the four core mental health disciplines (psychiatry, psychology, nursing, and social work) started as of July 1. This is an ideal beginning date for training grants since it represents the start for most psychiatric training programs and is a convenient starting date for other training institutions on a regular academic year operation.

When this review schedule was adopted in 1947, the training program was small and funds appropriated in June 1947, for instance, were awarded as of July 1, 1947. This allowed the schools to be notified of the grant awards prior to the beginning date and was an effective procedure. More recently, with the increasing size of the program and with the fact that funds do not actually become available until after the fiscal year has begun, a grantee often could not be given his grant until August or September. The mechanics of the procedure were such

that approved grantees could not even be notified as to the exact amount of their award until six weeks or longer beyond the July 1st date of activation of the grant, even though they were told late in June that they had been recommended by the National Advisory Mental Health Council for approval.

The above-described sequence in notification and award of funds imposes a severe hardship on the grantees. The status of their pending grant remains in doubt not only beyond the time where they can plan effectively for use of the funds but even beyond the activation date of the grant. Teaching positions and traineeships, which are dependent on these funds, are often difficult to fill when the grantee must wait until notification comes in August or September. If the grantee waits until notification there are very few, if any, candidates available either for the teaching positions or traineeships and the best use of funds is not possible. If the training institutions try to cope with this problem by actually hiring personnel or appointing trainees as of July 1, in the expectation of receiving all the funds requested, they place themselves in a precarious financial condition. The actual appropriation may be such that not all approved grants can be paid. In either case, the grantee begins his grant year under quite unsatisfactory circumstances.

The great need for expansion of training in the mental health disciplines made it impossible to correct this situation in the past. The expansion of the program, however, has compounded the problem. This year in an effort to relieve this increasingly difficult situation, and despite some resulting delay in further expansion, a plan has been developed for using funds from one fiscal year to finance the program for a period extending into or through the following fiscal year. All approved continuation applications for the grant period which ends June 30, 1960 were paid from 1960 funds as soon as they became available. At the same time, \$3,850,000 of the fiscal year 1960 funds was reserved to adjust the beginning dates into fiscal year 1961 for one or more major areas of support. All new grants will have beginning dates of July 1, 1961 and will thus start with the adjusted dates. This procedure will be continued each year until most mental health training grants are paid by using funds from one fiscal year to finance training grants in the subsequent year. Under this plan it will be possible to notify grantees well in advance of the beginning date of their grant, as to the exact amount of the award.

B. Increased Cost to Maintain Training Programs at Level Achieved in 1959

During 1959 the Institute was authorized to provide funds in fiscal year 1960 for: 1) increased rates in trainee stipends, 2) payment of tuition and fees, and 3) support of salary increases in

teaching costs. The cost of these three items, totalling approximately \$2,500,000 was a necessary expense in order to maintain the program at the same level as in 1959.

The change in rates in trainee stipends, for levels 4, 5, and 6, and the new level 7, was described in the previous annual report. This took effect July 1, 1959.

The plan to pay tuition and fees, recommended by Council in November 1958, also took effect July 1, 1959. The rationale for tuition payments was described as follows: a) The tuition costs to trainees above level 4 (where increases had been approved) are negligible. b) For students at the first four levels, however, the amount of tuition may vary from \$200 at a State University for a resident of the State to \$1,500 or more at private schools. c) Payment of tuition will insure, therefore, that all students receiving traineeships at these levels will have approximately the same amount for living costs and that educational benefits are equalized as nearly as possible.

The cost of salary increases in a program of this size, where teaching costs represent about 50% of the training grant funds, is not insignificant. Recent surveys made by the National Education Association on a large proportion of all types of schools of higher education show salary increases averaging better than 8%. In previous years this increase was a hidden cost in the expanded support. This year, however, because of both the amount involved in this item, - about one-fourth of the total for increased costs, - and because of the original expectation that the fiscal year 1960 support would be a holding budget, it was necessary to make special provision for inclusion of sufficient funds to pay these mandatory increases.

C. Distribution of Training Grant Funds

At the June 1958 meeting of the National Advisory Mental Health Council, the recommendation was unanimously approved that the fixed formula method of allocating training grant funds to the four basic disciplines be abolished. In recommending this change, the Council noted that greater responsibility would be placed on the staff and indicated that the Training Committee and the Council should be informed of the principles used in allocating funds so that these advisory groups may provide recommendations relative to future program development. In accordance with the wish of the Council a procedure was developed for use in allocating fiscal year 1960 funds. The Council, in June 1959, approved, in principle, this new procedure.

The procedure is dependent on three sets of data: 1) Past performance, in terms of training activities supported by NIMH grants for the preceding fiscal year; 2) The present expressed needs of the field for additional grant support as represented by total requests for grants in the year in question; 3) The proportion of these expressed needs identified as meritorious by the Training Committee as represented by approved requests in the year in question.

In contrast to the fixed formula which imposed a constant distribution from year to year, this method allows for new requests to play a part in determining how funds should be distributed.

While this procedure provides a system for dividing money among the various major categories, it does not give any information as to how the monies will be expended within any one category. This latter distribution is determined by the priorities given individual grant requests during the review procedure. The Training Subcommittees for each discipline established a single priority list for all approved applications. Thus, when the percentage established for psychiatry is applied against the total budget for training, the amount for grants in psychiatry will be placed against the single priority list in psychiatry and all grants will be paid down the priority list until the funds in psychiatry are exhausted. Similarly for funds in each of the other categories.

This procedure was actually utilized in a modified fashion in the distribution of funds for fiscal year 1960. Since only a very limited amount of the total budget went for program expansion, the funds were distributed so that each major area of support received an amount sufficient to maintain the 1959 level. An additional amount of slightly over \$1,000,000 was then distributed among the major areas of support by allocation according to the above-described procedure.

It should be pointed out that because of the extensive program changes this year it is quite likely that further modifications will be necessary in any future utilization of this procedure for distribution of funds.

D. Training Committee Structure and Functioning

In November 1958 the Council was informed of the recommendations for the revision of the structure and functioning of the Training Committee. A new committee organization, involving seven subcommittees as well as a Policy and Planning Board, was devised. This was described in detail in the annual report of last year.

In April 1959 the Subcommittees in Nursing, Psychiatry, Psychology, and Social Work, as well as an Ad Hoc Committee on Pilot, Special Projects, and Public Health met under the new organizational arrangement for review of grant applications. In May 1959 the two new subcommittees in the social and biological sciences met on an ad hoc basis to review applications. In October the first meeting of the new Policy and Planning Board was held, with representation from the four core discipline subcommittees. This latter group reviewed the past year's operation of the training program, including policies, procedures, and budget allocation.

At the present time, permanent subcommittees in the social and biological sciences are in the process of being formed. These will be composed of leading educators and researchers in these two fields, who are knowledgeable in the mental health aspects of their respective specialties. It is expected that the review meetings in March and April 1960 will function similarly to the meetings of spring 1959.

E. Schedule for Review and Approval of Grants

When the adjustment of beginning dates of grant awards, described above, was initiated it became apparent that a change in the entire review schedule would be necessary. Under the present procedure it would be necessary for applicants for new grants to meet a closing date for receipt of applications eighteen months in advance of the beginning date of the grant. It is desirable to have an interval of less than twelve months between filing of application and notification of action so that the applicant can make his request in terms of the "next" academic year rather than "year after next" as new applicants must do with the present schedule.

In order to achieve the desired interval between application and activation date a new review schedule is being established. Effective September 1, 1960, the regular closing date for receiving applications for training grants is being changed from December 15 to September 1 of each year. The closing date of September 1, 1960 will apply for all applications for the year beginning July 1, 1961. During this transition year current grantees who are applying for continuing grants beginning July 1, 1960 must file applications on December 15, 1959 and will be reviewed by the spring 1960 Training Subcommittee and the June 1960 Council meeting. In 1961 the Training Subcommittee will meet in January and applications will be reviewed at the March 1961 Council. Applicants will be notified of the action to be taken on their applications as soon as possible after the Council meets.

An announcement of this new filing date and review schedule was distributed to all applicants in November 1959.

F. Staff Operation

Early this year Dr. Vestermark was retired because of illness and Dr. Feldman became Chief of the Branch. In February Dr. Rowland Fullilove was added to the staff as a training specialist in psychiatry. At the same time efforts were being made to add additional staff to be responsible for the administration of the new programs in the social and biological sciences and to function as training specialists in these areas. Because of the qualifications needed for such a position it has not as yet been possible to find suitable candidates. The only other staff addition this year was Mrs. Elizabeth Turk, Analytical Statistician, to assist in the work of program analysis.

The rapid growth of the entire program in the past two years has put an increasing burden on staff time. Despite an almost uninterrupted schedule of site visits between August and April, the training specialists in the four core disciplines were unable to make all the visits that would have been desirable.

The entire operation of the program was reviewed in May with Dr. Endicott's Task Force on NIH Training Programs. This was one of the first projects initiated by Dr. Endicott after being appointed Associate Director for Training of the NIH. A special statement on the NIMH Training Program had been presented to Dr. Endicott in a memorandum of April 21, 1959 from Dr. Felix. This special statement described the current manpower trends in the mental health professions and pointed to the predicted shortages in all professions, based on Albee's survey for the Joint Commission on Mental Illness and Health. The statement indicated that the NIMH Training Program should play a part in efforts to meet the future manpower needs by expanding its support for all areas of mental health training.

The publication of a listing of mental health training grant awards for fiscal year 1959 was accomplished through the collaboration of the staff of the Training Branch and Grants Administration, and the Statistics and Analysis Branch of the Division of Research Grants. This document supplements Public Health Service Publication No. 701, Part II, "Training Grants, Research Fellowships, and Traineeships. Public Health Service Grants and Awards by the National Institutes of Health, Fiscal Year 1959." This is the first year such a detailed listing of grant awards by state and institution has been

made a public document. It includes data on the number of stipends and the amount awarded to each institution for trainees, as well as the teaching costs for individual mental health training grants. Summary tables by state and by area of training are also provided.

II. Program Development

This year saw the initiation of a number of new and/or expanded areas of training which were described in the annual report of last year and which were to begin as of July 1959. This includes (1) grants in the biological and social sciences in support of graduate research training programs relevant to mental health; (2) expanded support in the psychiatric training of general practitioners; (3) undergraduate teaching in human behavior in medical schools.

A. Training in Biological and Social Sciences

As of 1959, research training programs were being supported in psychology, as well as for the interdisciplinary training of scientists in the biological and social sciences. In fiscal year 1960 applications were received for support of research training programs in all four mental health disciplines. In addition, the announcement of extended support for research training in the biological and social sciences brought new applications totalling almost \$1,500,000 in these two specific areas of support alone. The bulk of these applications came from training institutions which have both the facilities and the leadership to accomplish such training. A total of approximately \$1,200,000 was awarded in 1960 for new and continuing programs in these two areas. It is expected that the coming year will produce a greatly expanded number of requests.

Of these awards in 1960 for research training in the biological sciences, the greatest proportion included considerable emphasis on psychopharmacology. The shortage of qualified research workers in this area is extremely acute. It is expected that, as support continues in the area of training in the biological sciences, there will be increasing emphasis on psychopharmacology. In addition to present support, training could be provided in departments of pharmacology which stress either predoctoral or postdoctoral work in neuropharmacology or behavioral pharmacology utilizing behavior scientists either in the department itself or having cooperative relationships with other university or medical school departments. Another possibility would be

a university training program making some use of industrial laboratories as training placement where the student can carry out research projects and gain experience in special techniques. Because of the urgent need for expansion in psychopharmacology research training, efforts are being made to explore ways of stimulating the development of new programs.

B. Psychiatric Training of General Practitioners

In 1959 the entire \$1,300,000 earmarked for this purpose was awarded. These funds supported training which will enable the general practitioner to act in a preventive role against mental illness and will add to the number of trained specialists who are needed in psychiatry. Of the total in 1959, the greater proportion was spent to provide physicians in practice with psychiatric residency training and a lesser amount to foster the development and expansion of postgraduate education and training in psychiatry for physicians intending to remain in their own field of specialization. It is quite apparent from number and quality of applications received since the initial announcement of the availability of these grants that there is a strong interest in the field. In fiscal year 1960 an additional \$1,000,000 will be awarded to pay for grants, some of which have already been approved and some of which are to be reviewed during the year.

As a result of the first year's experience a new and more comprehensive set of instructions for applicants has been developed. These instructions describe the purpose of the program, indicate eligibility requirements for training stipends, and stipulate the information needed for review of application. Beginning July 1, 1959, three closing dates were established; July 1, November 1, 1959, and March 1, 1960. Beginning September 1, 1960 these grants will have the same single annual closing date of September 1 as other applications, as described earlier.

C. Teaching in Human Behavior for Medical Students

This area of support was initiated in 1960 in an effort to develop training programs in medical schools which would lead to the integration of the behavioral sciences into the education of the modern physician. This would provide a broader scientific base for understanding human behavior and should bring more scientific knowledge to the student as well as exposing him to the research methodology. Research models are needed in the behavioral sciences

to provide the same constructive impact on medical education which is currently the effect of the existing basic science departments.

Because of the desire to support only the most outstanding programs in this new area, only four grants for a total of \$125,000 were awarded in 1960. It is hoped that this area of support can be expanded in the future as the early programs demonstrate their merit in these respective medical schools.

D. Other Program Expansion and Change

In all of the above-described areas of support, as well as the other areas of graduate and undergraduate training, the level of support for fiscal year 1960 did not represent an actual expansion of program equivalent to the expansion in fiscal year 1959 over the previous year. The reason for this is the utilization of a major proportion of the budget increase in 1960 to pay for the cost of adjustment of beginning dates of grant awards and the increased rates in trainee stipends, payment of tuition and fees, and teaching salary increases.

It was, therefore, not possible to provide support for program expansion at a level appropriate to the requests from the field. This is especially unfortunate at the present time because the training programs in all four mental health disciplines are at a point where the potential is available for training a greater number of people than in previous years. As one indication of this fact there were requests in the approved applications for 1960 for approximately 50% more trainee stipends than were awarded. In the light of Dr. Albee's manpower study, our present level of support will not meet the needs resulting from present population expansion.

Approximately \$975,000 of the funds available for Fiscal Year 1960 went into new grants and expansion of continuation grants in the four core professions, including public health training. This was accomplished at the expense of holding most of the continuation grants at a level of support comparable to that of 1959. An additional \$420,000 is going into new grants in training in the biological and social sciences, and pilot projects. As indicated earlier, all of the new grants are being initiated on a procedure of advance notification and will have beginning dates of July 1, 1960.

It is expected that the disruption in program development will continue to some extent until the entire procedure of advance notification has been completed for all continuation grants. Since the total for support of continuation programs at the present time is

approximately \$20,000,000, it would require an additional \$16,150,000 over the present reserve of \$3,850,000 to complete this procedure. It is hoped that these funds will become available at an early date so that program expansion may then continue in an orderly and progressive fashion.

Within the programs in the four core professions the major program developments that were possible under the budget limitations for this year can be briefly described as follows.

In training programs in psychiatry, there was some expansion in the area of research training. Three new grants were awarded for programs of research training. This represents the first of such programs being supported, which are organized around an integrated program of training in research for psychiatrists. In addition, the four new programs in the area of teaching in human behavior for medical students further implement the expansion in research training in psychiatry. This entire problem of research training in psychiatry was the topic of a conference supported with training funds and held in Florida in the spring, 1959. It is expected that a published summary of the conference proceedings will provide a valuable guide and stimulation to research training.

In the psychiatric teaching of medical students, there is a continuing interest on the part of the medical schools in these undergraduate psychiatry grants for the purpose of augmenting the teaching of the medical student in the general area of mental health and illness. In 1960 one new grant of \$25,000 was awarded, bringing the total to 88 medical schools and schools of osteopathy each receiving up to a maximum of \$25,000 for teaching costs.

In training programs in nursing, the small increase in funds over 1959 was used largely to expand existing graduate teaching grants in a limited number of training centers for the purpose of (1) introducing and improving research content in selected training programs, (2) expanding needed doctoral education in psychiatric nursing, and (3) including program offerings in nursing in child psychiatry. A small proportion of this allocation allowed for addition of faculty to meet increased enrollment needs. The remainder was used to support nursing trainees. It had been hoped, in keeping with the National Advisory Mental Health Council's previous recommendation, to increase the grant support for selected undergraduate psychiatric nursing grants to the maximum of \$25,000. However, the lack of funds precluded the awarding of any undergraduate grants at levels above the previous maximum of \$15,000. At the present time grants to support psychiatric teaching in the undergraduate curriculum are continuing in 72 collegiate schools of nursing.

In training programs in psychology, there was some expansion of support in both the clinical psychology training centers and centers for research training in psychology of relevance to mental health. The latter is a continuation and extension of the program of broadened support in psychology which was inaugurated in Fiscal Year 1959. It includes grants for the training of research personnel in areas of psychology such as experimental, physiological, child, and social psychology as well as the field of measurement. In addition to this broad area of research, training support had been extended in 1959 to programs of training in such special areas as geriatrics and mental retardation. It was possible to support some new grants in fiscal year 1960 in these various areas in the field of psychology by holding almost all the continuation grants to the level of support provided in 1959. The only new development in training support in psychology is a small experimental program of research training for undergraduate students. This program was initiated in the summer 1959 and provides grants to offer extra-curricular research experience for the early preparation and development of research interests in undergraduate students majoring in psychology.

The training programs in social work have increased to include grants to 51 of the 56 graduate schools of social work in the United States. Of these, 50 received grants in psychiatric social work and 17 in school social work. A new area of support was added in the awarding of grants to training programs in the fields of aging, family and child welfare, corrections, and community planning. This represents the first application of funds to the training of social work personnel for these preventive mental health programs. It is anticipated there will be increased future interest in broadened support as a means of preparing more personnel for such preventive mental health activities. One new program in research training has been inaugurated. The number of students with research career objectives in doctoral social work programs has increased. Additional grant support has been provided to research centers functioning within social work education.

In pilot projects, special grants, and grants for public health mental health, funds were available for only a slight expansion. Some increases in continuing grants in pilot projects and public health mental health were possible, as well as support for two special projects. The first project will be a workshop on curriculum for all graduate schools of social work to be held in June 1960, under the auspices of the Council on Social Work Education. This workshop is intended to serve as a phase of the Council's program of curriculum research and relates to the recent comprehensive curriculum study done by the

Council. The second project will be a six weeks' program in the summer of 1960 for instructors of collegiate schools of nursing on how to integrate psychiatric nursing principles in the general curriculum.

The entire area of training for community mental health and the need for additional support has been under consideration. At the meeting of the Policy and Planning Board of the Training Committee, in October 1959, it was noted that there are gaps in knowledge on how to develop preventive mental health programs and how to make practical use of public health content in the field of mental health. It was agreed that pilot projects should continue to be used to develop new ideas and new methods with the recognition that training can play an important role in the development of properly prepared personnel for community mental health work.

Some new grants as well as continuing grants were awarded in special areas of mental health. It had been pointed out in the annual report for 1958 that grant support is being offered to training centers to develop training programs for specialists in such areas as mental retardation, juvenile delinquency, alcoholism, and the aging process. In all four of the mental health professions the basic training is, of course, relevant to these special areas and some graduates of training programs eventually specialize in one or another of these areas. Efforts continue, at the same time, to stimulate additional and focused training in these areas. In the area of juvenile delinquency one continuing program at the Judge Baker Guidance Center is a large-scale, interdisciplinary development of a teaching and training program in the field of juvenile delinquency. In addition, as already mentioned, a new grant in the area of corrections will be awarded for FY 1960 to a school of social work. A total of five new and continuing grants in FY 1960 are partially or wholly for programs in aging. A total of eight new and continuing grants in FY 1960 are partially or wholly for programs in mental retardation.

III. Future Objectives

In the annual report for 1958 it had been pointed out that "the future direction of the training program will be more and more an emphasis of research training. At the same time, it is not likely that any deceleration of clinical training will be possible in the foreseeable future. Instead, all indications suggest continuing and serious shortages of clinical personnel in all mental health professions. The forthcoming report on manpower in mental health professions, to be published by the Joint Commission on Mental Illness and Health, will reemphasize this serious shortage. It is

likely, therefore, that there will be continued demands for increases in the number of clinically trained personnel."

Except that it is now possible to talk about the mental health manpower report in the past, rather than the future tense, the above statement still holds for the status of the training program. The developments in the program during calendar year 1959, in terms of support for continuation grants and the modest expansion in new grants possible under the budgetary limitations already described, all point to a continued need for growth of programs to produce qualified personnel across a broad spectrum of professional activity in the mental health field. Clinical as well as research personnel are needed, and they are needed both in areas dealing with immediate and acute problems of mental illness as well as equally important areas of preventive mental health work.

It is important to point out that the training centers over the past few years have shown strong and enthusiastic efforts to introduce new approaches in mental health training and to offer training programs in areas of critical manpower need. The readiness among these centers to make use of grant funds in these new or special areas has most often been underestimated. It is expected that, upon completion of the budgeting for adjustment of beginning dates of grant awards, it will be possible to implement the program expansion at a rate more in keeping with the training needs in mental health.

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